TAXIWAY INTERSECTION IMPROVEMENTS CITY PROJECT NO. 12455

ITEM C-110 METHOD OF ESTIMATING PERCENTAGE OF MATERIAL WITHIN SPECIFICATION LIMITS (PWL)

110-1 General. When the specifications provide for acceptance of material based on the method of estimating percentage of material within specification limits (PWL), the PWL will be determined in accordance with this section. All test results for a lot will be analyzed statistically to determine the total estimated percent of the lot that is within specification limits. The PWL is computed using the sample average (X) and sample standard deviation (S_n) of the specified number (n) of sublots for the lot and the specification tolerance limits, L for lower and U for upper, for the particular acceptance parameter. From these values, the respective Quality index, Q_L for Lower Quality Index and/or Q_U for Upper Quality Index, is computed and the PWL for the lot for the specified n is determined from Table 1. All specification limits specified in the technical sections shall be absolute values. Test results used in the calculations shall be to the significant figure given in the test procedure.

There is some degree of uncertainty (risk) in the measurement for acceptance because only a small fraction of production material (the population) is sampled and tested. This uncertainty exists because all portions of the production material have the same probability to be randomly sampled. The Contractor's risk is the probability that material produced at the acceptable quality level is rejected or subjected to a pay adjustment. The Owner's risk is the probability that material produced at the rejectable quality level is accepted.

It is the intent of this section to inform the Contractor that, in order to consistently offset the Contractor's risk for material evaluated, production quality (using population average and population standard deviation) must be maintained at the acceptable quality specified or higher. In all cases, it is the responsibility of the Contractor to produce at quality levels that will meet the specified acceptance criteria when sampled and tested at the frequencies specified.

110-2 Method for computing PWL. The computational sequence for computing PWL is as follows:

a. Divide the lot into n sublots in accordance with the acceptance requirements of the specification.

b. Locate the random sampling position within the sublot in accordance with the requirements of the specification.

c. Make a measurement at each location, or take a test portion and make the measurement on the test portion in accordance with the testing requirements of the specification.

d. Find the sample average (X) for all sublot test values within the lot by using the following formula:

$$\mathbf{X = (x_1 + x_2 + x_3 + \ldots x_n) / n}$$

Where: X = Sample average of all sublot test values within a lot

$x_1, x_2, \ldots x_n$ = Individual sublot test values

n = Number of sublot test values

e. Find the sample standard deviation (S_n) by use of the following formula:

$$S_n = [(d_1^2 + d_2^2 + d_3^2 + \ldots .d_n^2)/(n-1)]^{1/2}$$

Where: S_n = Sample standard deviation of the number of sublot test values in the set

$d_1, d_2, \ldots .d_n$ = Deviations of the individual sublot test values $x_1, x_2, \ldots$ from the average value X

that is: $d_1 = (x_1 - X)$, $d_2 = (x_2 - X) \ldots d_n = (x_n - X)$

n = Number of sublot test values

f. For single sided specification limits (i.e., L only), compute the Lower Quality Index Q_L by use of the following formula:

$$Q_L = (X - L) / S_n$$

Where: L = specification lower tolerance limit

Estimate the percentage of material within limits (PWL) by entering Table 1 with Q_L, using the column appropriate to the total number (n) of measurements. If the value of Q_L falls between values shown on the table, use the next higher value of PWL.

g. For double-sided specification limits (i.e., L and U), compute the Quality Indexes Q_L and Q_U by use of the following formulas:

$$Q_L = (X - L) / S_n$$
and
$$Q_U = (U - X) / S_n$$

Where: L and U = specification lower and upper tolerance limits

Estimate the percentage of material between the lower (L) and upper (U) tolerance limits (PWL) by entering Table 1 separately with Q_L and Q_U, using the column appropriate to the total number (n) of measurements, and determining the percent of material above P_L and percent of material below P_U for each tolerance limit. If the values of Q_L fall between values shown on the table, use the next higher value of P_L or P_U. Determine the PWL by use of the following formula:

$$PWL = (P_U + P_L) - 100$$

Where: P_L = percent within lower specification limit

P_U = percent within upper specification limit

EXAMPLE OF PWL CALCULATION

Project: Example Project

Test Item: Item P-401, Lot A.

A. PWL Determination for Mat Density.

1. Density of four random cores taken from Lot A.

A-1 = 96.60

A-2 = 97.55
A-3 = 99.30
A-4 = 98.35
n = 4

2. Calculate average density for the lot.

$X = (x_1 + x_2 + x_3 + . . . x_n) / n$
$X = (96.60 + 97.55 + 99.30 + 98.35) / 4$
X = 97.95% density

3. Calculate the standard deviation for the lot.

$S_n = \mathbf{[}((96.60 - 97.95)^2 + (97.55 - 97.95)^2 + (99.30 - 97.95)^2 + (98.35 - 97.95)^2)) / (4 - 1)\mathbf{]}^{1/2}$
$S_n = \mathbf{[}(1.82 + 0.16 + 1.82 + 0.16) / 3\mathbf{]}^{1/2}$
$S_n = 1.15$

4. Calculate the Lower Quality Index Q_L for the lot. (L=96.3)

$Q_L = (X - L) / S_n$
$Q_L = (97.95 - 96.30) / 1.15$
$Q_L = 1.4348$

5. Determine PWL by entering Table 1 with Q_L= 1.44 and n= 4.

PWL = 98

B. PWL Determination for Air Voids.

1. Air Voids of four random samples taken from Lot A.

A-1 = 5.00
A-2 = 3.74
A-3 = 2.30
A-4 = 3.25

2. Calculate the average air voids for the lot.

$X = (x_1 + x_2 + x_3 . . . n) / n$
$X = (5.00 + 3.74 + 2.30 + 3.25) / 4$
X = 3.57%

3. Calculate the standard deviation S_n for the lot.

$S_n = \mathbf{[}((3.57 - 5.00)^2 + (3.57 - 3.74)^2 + (3.57 - 2.30)^2 + (3.57 - 3.25)^2) / (4 - 1)\mathbf{]}^{1/2}$
$S_n = \mathbf{[}(2.04 + 0.03 + 1.62 + 0.10) / 3\mathbf{]}^{1/2}$
$S_n = 1.12$

4. Calculate the Lower Quality Index Q_L for the lot. (L= 2.0)

$Q_L = (X - L) / S_n$
$Q_L = (3.57 - 2.00) / 1.12$
$Q_L = 1.3992$

5. Determine P_L by entering Table 1 with Q_L = 1.41 and n = 4.

$P_L = 97$

6. Calculate the Upper Quality Index Q_U for the lot. (U= 5.0)

$Q_U = (U - X) / S_n$

$Q_U = (5.00 - 3.57) / 1.12$

$Q_U = 1.2702$

7. Determine P_U by entering Table 1 with $Q_U = 1.29$ and n = 4.

$P_U = 93$

8. Calculate Air Voids PWL

$PWL = (P_L + P_U) - 100$

$PWL = (97 + 93) - 100 = 90$

EXAMPLE OF OUTLIER CALCULATION (REFERENCE ASTM E178)

Project: Example Project

Test Item: Item P-401, Lot A.

A. Outlier Determination for Mat Density.

1. Density of four random cores taken from Lot A arranged in descending order.

A-3 = 99.30

A-4 = 98.35

A-2 = 97.55

A-1 = 96.60

2. From ASTM E178, Table 1, for n=4 an upper 5% significance level, the critical value for test criterion = 1.463.

3. Use average density, standard deviation, and test criterion value to evaluate density measurements.

a. For measurements greater than the average:

If (measurement - average)/(standard deviation) is less than test criterion, then the measurement is not considered an outlier.

For A-3, check if (99.30 - 97.95) / 1.15 is greater than 1.463.

Since 1.174 is less than 1.463, the value is not an outlier.

b. For measurements less than the average:

If (average - measurement)/(standard deviation) is less than test criterion, then the measurement is not considered an outlier.

For A-1, check if (97.95 - 96.60) / 1.15 is greater than 1.463.

Since 1.435 is less than 1.463, the value is not an outlier.

Note: In this example, a measurement would be considered an outlier if the density were:

Greater than (97.95 + 1.463 × 1.15) = 99.63%

OR

less than (97.95 - 1.463 × 1.15) = 96.27%.

Table 1. Table for Estimating Percent of Lot Within Limits (PWL)

Percent Within Limits (P_L and P_U)	Positive Values of Q (Q_L and Q_U)							
	n=3	n=4	n=5	n=6	n=7	n=8	n=9	n=10
99	1.1541	1.4700	1.6714	1.8008	1.8888	1.9520	1.9994	2.0362
98	1.1524	1.4400	1.6016	1.6982	1.7612	1.8053	1.8379	1.8630
97	1.1496	1.4100	1.5427	1.6181	1.6661	1.6993	1.7235	1.7420
96	1.1456	1.3800	1.4897	1.5497	1.5871	1.6127	1.6313	1.6454
95	1.1405	1.3500	1.4407	1.4887	1.5181	1.5381	1.5525	1.5635
94	1.1342	1.3200	1.3946	1.4329	1.4561	1.4717	1.4829	1.4914
93	1.1269	1.2900	1.3508	1.3810	1.3991	1.4112	1.4199	1.4265
92	1.1184	1.2600	1.3088	1.3323	1.3461	1.3554	1.3620	1.3670
91	1.1089	1.2300	1.2683	1.2860	1.2964	1.3032	1.3081	1.3118
90	1.0982	1.2000	1.2290	1.2419	1.2492	1.2541	1.2576	1.2602
89	1.0864	1.1700	1.1909	1.1995	1.2043	1.2075	1.2098	1.2115
88	1.0736	1.1400	1.1537	1.1587	1.1613	1.1630	1.1643	1.1653
87	1.0597	1.1100	1.1173	1.1192	1.1199	1.1204	1.1208	1.1212
86	1.0448	1.0800	1.0817	1.0808	1.0800	1.0794	1.0791	1.0789
85	1.0288	1.0500	1.0467	1.0435	1.0413	1.0399	1.0389	1.0382
84	1.0119	1.0200	1.0124	1.0071	1.0037	1.0015	1.0000	0.9990
83	0.9939	0.9900	0.9785	0.9715	0.9671	0.9643	0.9624	0.9610
82	0.9749	0.9600	0.9452	0.9367	0.9315	0.9281	0.9258	0.9241
81	0.9550	0.9300	0.9123	0.9025	0.8966	0.8928	0.8901	0.8882
80	0.9342	0.9000	0.8799	0.8690	0.8625	0.8583	0.8554	0.8533
79	0.9124	0.8700	0.8478	0.8360	0.8291	0.8245	0.8214	0.8192
78	0.8897	0.8400	0.8160	0.8036	0.7962	0.7915	0.7882	0.7858
77	0.8662	0.8100	0.7846	0.7716	0.7640	0.7590	0.7556	0.7531
76	0.8417	0.7800	0.7535	0.7401	0.7322	0.7271	0.7236	0.7211
75	0.8165	0.7500	0.7226	0.7089	0.7009	0.6958	0.6922	0.6896
74	0.7904	0.7200	0.6921	0.6781	0.6701	0.6649	0.6613	0.6587
73	0.7636	0.6900	0.6617	0.6477	0.6396	0.6344	0.6308	0.6282
72	0.7360	0.6600	0.6316	0.6176	0.6095	0.6044	0.6008	0.5982
71	0.7077	0.6300	0.6016	0.5878	0.5798	0.5747	0.5712	0.5686
70	0.6787	0.6000	0.5719	0.5582	0.5504	0.5454	0.5419	0.5394
69	0.6490	0.5700	0.5423	0.5290	0.5213	0.5164	0.5130	0.5105
68	0.6187	0.5400	0.5129	0.4999	0.4924	0.4877	0.4844	0.4820
67	0.5878	0.5100	0.4836	0.4710	0.4638	0.4592	0.4560	0.4537
66	0.5563	0.4800	0.4545	0.4424	0.4355	0.4310	0.4280	0.4257
65	0.5242	0.4500	0.4255	0.4139	0.4073	0.4030	0.4001	0.3980
64	0.4916	0.4200	0.3967	0.3856	0.3793	0.3753	0.3725	0.3705
63	0.4586	0.3900	0.3679	0.3575	0.3515	0.3477	0.3451	0.3432
62	0.4251	0.3600	0.3392	0.3295	0.3239	0.3203	0.3179	0.3161
61	0.3911	0.3300	0.3107	0.3016	0.2964	0.2931	0.2908	0.2892
60	0.3568	0.3000	0.2822	0.2738	0.2691	0.2660	0.2639	0.2624
59	0.3222	0.2700	0.2537	0.2461	0.2418	0.2391	0.2372	0.2358
58	0.2872	0.2400	0.2254	0.2186	0.2147	0.2122	0.2105	0.2093
57	0.2519	0.2100	0.1971	0.1911	0.1877	0.1855	0.1840	0.1829
56	0.2164	0.1800	0.1688	0.1636	0.1607	0.1588	0.1575	0.1566
55	0.1806	0.1500	0.1406	0.1363	0.1338	0.1322	0.1312	0.1304
54	0.1447	0.1200	0.1125	0.1090	0.1070	0.1057	0.1049	0.1042
53	0.1087	0.0900	0.0843	0.0817	0.0802	0.0793	0.0786	0.0781
52	0.0725	0.0600	0.0562	0.0544	0.0534	0.0528	0.0524	0.0521
51	0.0363	0.0300	0.0281	0.0272	0.0267	0.0264	0.0262	0.0260
50	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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Percent Within Limits (P_L and P_U)	Negative Values of Q (Q_L and Q_U)							
	n=3	n=4	n=5	n=6	n=7	n=8	n=9	n=10
49	-0.0363	-0.0300	-0.0281	-0.0272	-0.0267	-0.0264	-0.0262	-0.0260
48	-0.0725	-0.0600	-0.0562	-0.0544	-0.0534	-0.0528	-0.0524	-0.0521
47	-0.1087	-0.0900	-0.0843	-0.0817	-0.0802	-0.0793	-0.0786	-0.0781
46	-0.1447	-0.1200	-0.1125	-0.1090	-0.1070	-0.1057	-0.1049	-0.1042
45	-0.1806	-0.1500	-0.1406	-0.1363	-0.1338	-0.1322	-0.1312	-0.1304
44	-0.2164	-0.1800	-0.1688	-0.1636	-0.1607	-0.1588	-0.1575	-0.1566
43	-0.2519	-0.2100	-0.1971	-0.1911	-0.1877	-0.1855	-0.1840	-0.1829
42	-0.2872	-0.2400	-0.2254	-0.2186	-0.2147	-0.2122	-0.2105	-0.2093
41	-0.3222	-0.2700	-0.2537	-0.2461	-0.2418	-0.2391	-0.2372	-0.2358
40	-0.3568	-0.3000	-0.2822	-0.2738	-0.2691	-0.2660	-0.2639	-0.2624
39	-0.3911	-0.3300	-0.3107	-0.3016	-0.2964	-0.2931	-0.2908	-0.2892
38	-0.4251	-0.3600	-0.3392	-0.3295	-0.3239	-0.3203	-0.3179	-0.3161
37	-0.4586	-0.3900	-0.3679	-0.3575	-0.3515	-0.3477	-0.3451	-0.3432
36	-0.4916	-0.4200	-0.3967	-0.3856	-0.3793	-0.3753	-0.3725	-0.3705
35	-0.5242	-0.4500	-0.4255	-0.4139	-0.4073	-0.4030	-0.4001	-0.3980
34	-0.5563	-0.4800	-0.4545	-0.4424	-0.4355	-0.4310	-0.4280	-0.4257
33	-0.5878	-0.5100	-0.4836	-0.4710	-0.4638	-0.4592	-0.4560	-0.4537
32	-0.6187	-0.5400	-0.5129	-0.4999	-0.4924	-0.4877	-0.4844	-0.4820
31	-0.6490	-0.5700	-0.5423	-0.5290	-0.5213	-0.5164	-0.5130	-0.5105
30	-0.6787	-0.6000	-0.5719	-0.5582	-0.5504	-0.5454	-0.5419	-0.5394
29	-0.7077	-0.6300	-0.6016	-0.5878	-0.5798	-0.5747	-0.5712	-0.5686
28	-0.7360	-0.6600	-0.6316	-0.6176	-0.6095	-0.6044	-0.6008	-0.5982
27	-0.7636	-0.6900	-0.6617	-0.6477	-0.6396	-0.6344	-0.6308	-0.6282
26	-0.7904	-0.7200	-0.6921	-0.6781	-0.6701	-0.6649	-0.6613	-0.6587
25	-0.8165	-0.7500	-0.7226	-0.7089	-0.7009	-0.6958	-0.6922	-0.6896
24	-0.8417	-0.7800	-0.7535	-0.7401	-0.7322	-0.7271	-0.7236	-0.7211
23	-0.8662	-0.8100	-0.7846	-0.7716	-0.7640	-0.7590	-0.7556	-0.7531
22	-0.8897	-0.8400	-0.8160	-0.8036	-0.7962	-0.7915	-0.7882	-0.7858
21	-0.9124	-0.8700	-0.8478	-0.8360	-0.8291	-0.8245	-0.8214	-0.8192
20	-0.9342	-0.9000	-0.8799	-0.8690	-0.8625	-0.8583	-0.8554	-0.8533
19	-0.9550	-0.9300	-0.9123	-0.9025	-0.8966	-0.8928	-0.8901	-0.8882
18	-0.9749	-0.9600	-0.9452	-0.9367	-0.9315	-0.9281	-0.9258	-0.9241
17	-0.9939	-0.9900	-0.9785	-0.9715	-0.9671	-0.9643	-0.9624	-0.9610
16	-1.0119	-1.0200	-1.0124	-1.0071	-1.0037	-1.0015	-1.0000	-0.9990
15	-1.0288	-1.0500	-1.0467	-1.0435	-1.0413	-1.0399	-1.0389	-1.0382
14	-1.0448	-1.0800	-1.0817	-1.0808	-1.0800	-1.0794	-1.0791	-1.0789
13	-1.0597	-1.1100	-1.1173	-1.1192	-1.1199	-1.1204	-1.1208	-1.1212
12	-1.0736	-1.1400	-1.1537	-1.1587	-1.1613	-1.1630	-1.1643	-1.1653
11	-1.0864	-1.1700	-1.1909	-1.1995	-1.2043	-1.2075	-1.2098	-1.2115
10	-1.0982	-1.2000	-1.2290	-1.2419	-1.2492	-1.2541	-1.2576	-1.2602
9	-1.1089	-1.2300	-1.2683	-1.2860	-1.2964	-1.3032	-1.3081	-1.3118
8	-1.1184	-1.2600	-1.3088	-1.3323	-1.3461	-1.3554	-1.3620	-1.3670
7	-1.1269	-1.2900	-1.3508	-1.3810	-1.3991	-1.4112	-1.4199	-1.4265
6	-1.1342	-1.3200	-1.3946	-1.4329	-1.4561	-1.4717	-1.4829	-1.4914
5	-1.1405	-1.3500	-1.4407	-1.4887	-1.5181	-1.5381	-1.5525	-1.5635
4	-1.1456	-1.3800	-1.4897	-1.5497	-1.5871	-1.6127	-1.6313	-1.6454
3	-1.1496	-1.4100	-1.5427	-1.6181	-1.6661	-1.6993	-1.7235	-1.7420
2	-1.1524	-1.4400	-1.6016	-1.6982	-1.7612	-1.8053	-1.8379	-1.8630
1	-1.1541	-1.4700	-1.6714	-1.8008	-1.8888	-1.9520	-1.9994	-2.0362

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REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM E178 Standard Practice for Dealing with Outlying Observations

END OF ITEM C-110

ITEM S-102

AIRPORT SAFETY AND MAINTENANCE OF AIR OPERATIONS AREA TRAFFIC REQUIREMENTS

GENERAL

102-1.1 SUMMARY

a. The work specified in this Section consists of airport safety and maintaining traffic within the limits of the project for the duration of the construction period. It shall include the construction and maintenance of any necessary detour facilities along the project and the furnishing, installing and maintaining of traffic control and safety devices required for safe and expeditious movement of traffic as may be called for on the plans. The term "Maintenance of Traffic" or MOT as used herein shall include all of such facilities, devices and operations as are required for the safety and convenience of the Airport users as well as for minimizing public nuisance; all as specified in this Section. The Section also includes installing temporary orange plastic fencing around any owl or tortoise nests, as directed by the Engineer or Owner's Representative.

b. The Contractor shall carry out its operations in a manner that will cause a minimum of interference with air traffic, and shall be required to cooperate with the Federal Aviation Administration (FAA), the Fort Lauderdale Executive Airport, airport operations, and other contractors working in the area. All work shall be completed in accordance with the Contract Documents including the Safety Program and FAA Advisory Circular 150/5370-2F, Operational Safety on Airports during Construction or current edition as of bid date.

c. The Contractor shall supply, place, maintain, move and store the items listed herein, as appropriate, to facilitate construction and protect air traffic. The Contractor shall maintain an adequate extra supply of these items on site.

d. The generalized overviews presented in this document are statements of expectations that the Contractor will be measured against. Failure to meet these requirements may be grounds for the removal of the individual employee from the worksite and could also lead to grounds for termination of the Contract by the City.

e. The Contractor shall provide an on-site safety coordinator for the duration of the contract if the value of the work to be performed is in excess of $250,000 and requires more than four hundred (400) man-hours to be completed for the duration of any one week. If less than four hundred (400) man-hours are worked in a work week, then a Safety Coordinator shall be appointed, but does not have to be onsite.

f. The Contractor must not interfere with or make more difficult or expensive Airport's compliance with any law, statue, code, ordinance or regulation. The

Airport will notify the Contractor, orally or in writing, and the Contractor shall within forty-eight hours of receiving Airport's notification make whatever changes are necessary to remedy the situation, including, without limitation, changes in the work schedule, installation of safety devices. Airport's exercise of its rights under this provision will not be grounds for an increase in the Contract Sum under the Contract.

g. The Fort Lauderdale Executive Airport has the right to monitor (Contractor shall still be responsible for assuring safe work practices) the Contractors' operations for safety performance, workmanship, protection of operations, work progress, housekeeping, and compliance to design specifications. It is a general practice that the Fort Lauderdale Executive Airport will work through the Contractor's supervision and not directly with the employee. The Fort Lauderdale Executive Airport has the right to participate with and investigate any accident or incident.

102-1.2 DEFINITIONS. Safety Program – The Contractor shall submit its Safety Program to the Fort Lauderdale Executive Airport and obtain approval prior to issuance of the Notice to Proceed. The Safety Program shall be prepared in accordance with the FAA Advisory Circular 150/5370-2F, or current edition as of bid date, Operation Safety on Airports During Construction and the Airport's Safety Program requirements defined in this Airport Safety Requirements section. The Safety Program includes, but is not limited to the following:

1. Contractor's Corporate Safety Policy
2. Contractor's Site Specific Safety Plan
3. Construction Safety and Phasing Plan (CSPP) – The Contractor shall abide by the CSPP, approved by the FAA and provided by Fort Lauderdale Executive Airport.
4. Safety Plan Compliance Document (SPCD) – The SPCD details how the contractor will comply with the CSPP. The Contractor shall prepare the SPCD and obtain approval by Fort Lauderdale Executive Airport prior to issuance of the Notice to Proceed.

PRODUCTS

102-2.1 WARNING LIGHTS. Warning lights shall meet the requirements of FAA Advisory Circular 150/5370-2F, or current edition as of bid date, Operational Safety on Airport during Construction. The Contractor's vehicles shall meet the requirements of FAA Advisory Circular 150/5210-5D or current edition as of bid date, Painting, Marking, and Lighting of Vehicles Used on an Airport.

102-2.2 LOW PROFILE BARRICADES. The terms "low profile barricades" and "low level airfield barricades" are used interchangeably in this contract. Low profile barricades shall be in accordance with the details in the Contract Documents and meet the requirements of FAA Advisory Circular 150/5370-2F, or current edition as of bid date. The barricades shall be furnished, maintained and relocated during each phase by the Contractor. Barricades shall be as detailed and installed along the affected pavement edge or access to a closed runway, taxiway or apron.

a. Contractor shall have a person on call 24 hours a day for emergency maintenance of airport hazard lighting and barricades.

b. The contractor must file the contact person's information with the airport operator.

c. Lighting should be checked by contractor for proper operation at least once per day, preferably at dusk.

d. The contractor will provide up to 120 additional barricades, beyond what is show on the plans, at no additional cost, to be furnished, maintained, and relocated in any subphase as directed by the Airport Staff or RPR.

e. Provide two sets of sandbags for each barricade.

f. All barricades to be filled with water. Water level should be checked by contractor at least once per week.

102-2.3 SAFETY FENCE. Safety fence shall be furnished and installed at the locations as indicated on the Contract Documents and/or directed by the Resident Project Representative (RPR).

a. Contractor will provide safety fencing to surround a minimum of 10 owl/tortoise borrows.

102-2.4 VACUUM SWEEPER. Only vacuum sweepers will be allowed on the airfield by default. If the Contractor wishes to use a broom type sweeper, the request must be submitted to the City for approval. If the City approves a broom type sweeper, only nylon bristles will be allowed.

~~**102-2.5 RUNWAY CLOSURE MARKER (LIGHTED X)**. Contractor shall provide runway closure markers as needed during construction. Contractor will be responsible for placement, relocation, maintenance, and removal of the lighted X's. Contractor shall be responsible for fuel, maintaining tire pressure, replacement light bulbs, other maintenance, and repairs to keep the units in good working order. Contractor shall be responsible for repair of all pavement damage that may result from fueling and operation of runway closure markers. Contractor will maintain ownership of runway closure markers at project completion.~~

102-2.6 TAXIWAY CLOSURE MARKER. Taxiway closure markers shall be furnished and installed at the locations as indicated on the Contract Documents and/or directed by the RPR.

102-2.7 PORTABLE LIGHT TOWERS. The Contractor shall provide portable light towers as required for work. The towers shall be trailer mounted, that can be folded for easy transport and storage. The towers shall contain a diesel generator to power a minimum 6000 watts and have fuel capacity to operate at full load for a minimum of 48 hours. It shall be designed to be weather proof. The towers shall be telescoping and capable of rotating over 360 degrees and shall have a minimum of four 1,000 watt metal halide floodlights. Contractor shall be responsible for repair of all pavement damage that may result from fueling and operation of portable light towers.

102-2.8 PORTABLE GUARD SHACK. The Contractor shall provide a portable security guard shack with AC, lights, and generator at the construction access gate. The security guard shack shall be manned during construction hours.

102-2.9 TYPE II BARRICADES. FDOT Type II Barricades shall be furnished and installed at the locations as indicated on the Contract Documents and/or directed by the Resident Project Representative (RPR).

a. In addition to locations shown on plans the contractor will provide sufficient Type II Barricades to surround a minimum of 10 owl/tortoise borrows.

EXECUTION

102-3.1 GENERAL INFORMATION.

a. All Contractors will comply with the following:

1. All applicable Occupational Safety and Health Administration (OSHA), Federal Aviation Administration (FAA), Federal Aviation Regulations (FAR), Transportation Security Administration (TSA) Part 1542, Department of Transportation (DOT), Airport Ordinances, Federal, State, and Local safety standards.
2. Other reasonable safety rules and practices as may be established from time to time by the Fort Lauderdale Executive Airport.

b. In compliance with FAA AC 150/5370-2F, or current edition as of bid date, the Contractor shall prepare a Safety Plan Compliance Document (SPCD). This document shall include a general statement by the Contractor that he/she has read and will abide by the CSPP. Any details not identifiable for the CSPP should be included within the SPCD. The SPCD is similar to the CSPP but shall not contain duplicate information. The contractor must submit the SPCD to the Fort Lauderdale Executive Airport for approval prior to the issuance of the NTP. The SPCD shall include but not be limited to the following Checklist as applicable to the scope of the project:

1. **Coordination.** Discuss details of proposed safety meetings with the Airport and with contractor employees and subcontractors.
2. **Phasing**. Discuss proposed construction schedule elements, including:
   i. Duration of each phase.
   ii. Daily start and finish of construction, including “night only” construction.
   iii. Duration of construction activities during:
      1. Normal runway operations.
      2. Closed runway operations.
      3. Modified runway “Aircraft Reference Code” usage.
3. **Areas and operations affected by the construction activity.** These areas and operations should be identified in the CSPP and should not require an entry in the SPCD.
4. **Protection of NAVAIDS.** Discuss specific methods proposed to protect operating NAVAIDS.
5. **Contractor access.** Provide the following:
   i. Details on how the Contractor will maintain the integrity of the Airport security fence (contract security officers, daily log of construction personnel, and other).
   ii. Listing of individual requiring driver training (for certificated airports and as requested).

iii. Radio communications.
    1. Airport Operations will communicate with the Air Traffic control tower.
    2. Types of radios and backup capabilities.
    3. Who will be monitoring radios.
    4. Details on how the contractor will escort material delivery vehicles.

6. **Wildlife management.** Discuss the following:
    i. Methods and procedures to prevent wildlife attraction.
    ii. Wildlife reporting procedures.
7. **Foreign Object Debris (FOD) management.** Discuss equipment and methods for control of FOD, including construction debris and dust.
8. **Hazardous material (HAZMAT) management.** Discuss equipment and methods for responding to hazardous spills.
9. **Notification of construction activities.** Provide the following:
    i. Contractor points of contact.
    ii. Contractor emergency contact.
    iii. Listing of tall or other requested equipment proposed for use on the airport and the time frame for submitting 7460-1 forms not previously submitted by the Airport operator.
10. **Inspection requirements.** Discuss daily (or more frequent) inspections and special inspection procedures.
11. **Underground utilities.** Discuss proposed methods of identifying and protecting underground utilities.
12. **Penalties.** Penalties should be identified in the CSPP and should not require an entry in the SPCD.
13. **Special conditions.** Discuss proposed actions for each special condition identified in the CSPP.
14. **Runway and taxiway visual aids.** Including marking, lighting, signs and visual NAVAIDs. Discuss proposed visual aids including the following:
    i. Equipment and methods for covering signage and airfield lights.
    ii. Equipment and methods for temporary closure markings (paint, fabric, other).
    iii. Types of temporary Visual Guidance Slope Indicators (VGSI).
15. **Markings and signs for access routes.** Discuss proposed methods of demarcating access routes for vehicle drivers.
16. **Hazard marking and lighting.** Discuss proposed equipment and methods for identifying excavation areas.
17. **Protection of runway and taxiway safety areas.** Including object free areas, obstacle free zones, and approach/departure surfaces. Discuss proposed methods of identifying, demarcating, and protecting airport surfaces including:
    i. Equipment and methods for maintaining Taxiway Safety Area standards.
    ii. Equipment and methods for separation of construction operations from aircraft operations, including details of barricades.
18. **Other limitations on construction** should be identified in the CSPP and should not require an entry in the SPCD.

c. The Safety Program, including the SPCD, shall be submitted to the Fort Lauderdale Executive Airport for review.

d. Regular progress meetings will be conducted during construction. Part of the meeting will be dedicated to safety. During these meetings, the Contractor shall submit to the Fort Lauderdale Executive Airport the following safety information:

1. Estimated man-hours worked from the previous period;
2. Number of near misses from the previous period;
3. Number of accidents from the previous periods;
4. Number of recordable injuries from the previous period; and
5. Summarization of any accident that took place from the previous period.

e. In estimating the work involved in the Contract, the Contractor shall be familiar with all existing and limiting conditions that will or may have a bearing on the performance of the Contract with regard to safety. Any limiting conditions shall be identified in writing.

f. All costs related to the required Safety Program shall be included in the Contractor's bid. Costs provided to administer and maintain the Safety Program shall be complete and shall include costs for all required personnel, activities, facilities, media, tools, drug testing, and any specialty equipment required to ensure a comprehensive, qualified Safety Program to suit a per week/per shift basis.

g. Prior to mobilization the Contractor shall complete a Contractor Employee Review of the Contractor Safety Guidelines. This document shall be kept on site and updated for every new employee who will work on the project.

h. Authorized Movement Area routes will be determined by the City. The Contractor shall not enter or cross any open runway or taxiway without an authorized escort. Non-compliance will result in removal of the violator from the job site and the violator’s Airport Identification Badge will be confiscated. Emergencies and operating conditions may necessitate sudden changes, both in Airport operations and in the operations of the Contractor. Aircraft operations shall always have priority over any and all of the Contractor’s operations. Should runways or taxiways be required for the use of aircraft and should Airport Operations, the Control Tower, or the Airport Engineer deem the Contractor to be too close to active runways or taxiways the Contractor shall suspend his operations, remove his personnel, plant, equipment, and materials to a safe distance and stand by until the runways and taxiways are no longer required for use by aircraft. There will be no compensation for delays or inefficiencies due to these changes.

i. Throughout the duration of the Contract, any practice or situation that the Airport Engineer determines to be unsafe or a hindrance to regular Airport operations shall be immediately rectified.

j. Prior to commencement of construction activity, the Contractor shall notify in writing, at least 72 hours in advance, Airport Operations and the Airport Engineer of its intentions to begin construction, stating the proposed time, date, and area of which construction is to occur in order for the appropriate Notice-to-Airmen (NOTAM) to be issued. During the performance of this Contract, the

Airport facility shall remain in use to the maximum extent possible. The Contractor shall not allow employees, subcontractors, suppliers, or any other unauthorized persons to enter in any Airport area which may be open for aircraft use.

k. Should, in the opinion of the City, any problem or hazard arise during construction, the Contractor shall immediately rectify/correct the problem or hazard to the satisfaction of the City and the Fort Lauderdale Executive Airport:

102-3.2 CONTRACTOR REQUIREMENTS.

a. All persons entering the project area designated as the construction site shall strictly follow OSHA, FDEP, FAA, DOT, and TSA regulations.

b. The Contractor shall provide physical barriers along the perimeter of its work site and place signs identifying the area as a construction site. In some cases where the general public or open airfield is to be protected, additional and/or specialty barriers might be required and will need to be determined by the Airport.

c. If used, the Contractor shall submit an FAA Form 7460-1 at least 60 days prior to any crane erections. All construction involving cranes shall further be coordinated at least 72 hours in advance, excluding weekends, with the FXE Airfield Operations Department. This does not include the time required for airspacing. The following information and actions are required:

1. Location of the Crane.
2. Maximum extendable height.
3. Hours of operation.
4. The top of each crane boom shall be marked by a 3' x 3' orange and white checkered flag — each box being 1' square.
5. Each crane shall be lowered at night and during periods of poor visibility as directed by Airport Operations. In the event the crane is approved to remain extended during the hours from sunset to sunrise, the highest point of the crane boom will be lit with a red obstruction light in accordance with AC 70/7460-1.

d. These established safety requirements shall govern Contractors and all persons within the designated construction site and are outlined to avoid infractions of common accepted safety practices.

e. These safety requirements shall not be construed as complete and any requirements of the guidelines in conflict with OSHA and FAA shall be superseded by OSHA or FAA regulations.

f. Any individual failing to follow these safety requirements will be directed by the Contractor to immediately abate the unsafe act, behavior, or equipment.

g. All Contractor equipment brought onsite for use on or during the construction project shall be kept in a safe operating condition. Worn or damaged equipment shall be repaired, replaced or taken out of service (locked out) and removed from the job site.

h. Contractor shall keep its work area in a clean and safe condition.

i. The use of makeshift, defective or inadequate scaffolding, rigging, or staging is prohibited.

j. Contractor shall verify and assure that every employee who operates any mobile equipment on Airport properties shall have a current valid driver's license.

k. The Contractor shall comply with the National Electric Code (NEC) requirements regarding ground fault circuit interrupters for construction field tools and equipment.

l. The Contractor shall maintain a Safety Program, for the purpose of safety, security, orientation, education, training, enforcement, and distribution.

m. If a fire line or any type of fire suppression service is going to be taken out of service, the Contractor must coordinate with the City's Fire Marshal or a designated representative from the Fire Department at least three days in advance. In addition, the contractor shall complete an impairment notification to the insurance carrier.

n. Contractor will provide all lighted, low profile, water or sand filled, taxiway/runway barricading.

o. If working on the AOA, the Contractor will be required to prepare an FAA Safety Plan Compliance Document (SPCD) that is a part of the Safety Program.

p. Employees shall not operate any equipment or vehicles more than 16 hours consecutively.

102-3.3 HAZARDOUS MATERIALS.

a. Hazardous materials can be easily identified using the U.S. Department of Transportation (DOT) labeling and identification system. All hazardous materials arriving on site shall be properly labeled, stored, and managed as required by the Material Safety Data Sheet (MSDS) for that material.

b. Contractors and Subcontractors are required to have copies of all MSDS's for all materials brought on site.

c. Contractor to immediately report spills to Airport Operations.

102-3.4 VEHICLE OPERATION ON AIRPORT OPERATIONS AREA (AOA).

a. All vehicles that enter the AOA shall comply with the following:

b. All vehicles accessing the AOA shall be placarded with a company name and logo or some other approved form of identification.

c. All vehicles shall be limited to the perimeter service road, paved leasehold areas and/or construction areas unless specifically authorized by Airport Operations.

1. All construction vehicles/mechanized equipment authorized within the Movement Area or related safety areas shall be marked with a flag on a staff attached to the uppermost portion of the vehicle/motorized equipment or an amber beacon so that the flag or beacon will be readily visible. The flag shall be at least a 3' x 3' square having a checkered pattern of international orange and white squares at least 1' on each side in accordance with FAA Advisory Circular 150/5210-5.D, or current edition as of bid date. The amber beacon will be as described in this specification.
2. During nighttime hours, all equipment operating on the Airport exceeding 15 feet in height shall be lit with a red obstruction light in accordance with FAA Advisory Circular 70/7460-1, or current edition as of bid date. This light is to be located on the uppermost portion of the equipment.
3. All construction equipment that exceeds 20 feet in height are required to be reviewed by the FAA for conformance with Part 77. This will require the submission of FAA form 7460-1 (submitted at: http://oeaa.faa.gov) and receipt of a "determination of no hazard to air navigation". The Contractor is also required to notify Airport Operations so that staff may issue any required NOTAMs.

d. Contractor utilized bicycles, motorcycles and two-wheeled scooters are prohibited on the AOA.

e. Vehicle(s)/equipment shall be operated in a manner that does not interfere with aircraft operations. All vehicle(s)/equipment shall yield right of way to all aircraft and emergency vehicles.

f. Vehicles/mechanized equipment operators shall obey all traffic signs and markings.

g. Vehicles/equipment shall not stop or be parked so as to block a driveway, AOA access gate, fire lane or aircraft

h. Vehicles/equipment shall not stop or be parked in areas other than those prearranged and approved by Airport Operations.

i. No equipment or vehicles may be parked within six feet of an AOA fence.

j. The established speed limit on the Ramp and AOA is 15 mph.

k. Vehicle(s)/equipment shall not be operated by individuals under the influence of any substance which impairs the ability to do so in a safe manner

l. If an incident occurs on the AOA, the incident shall be reported immediately to Airport Operations. The Contractor is still obligated to produce its own incident report to be submitted to the Airport upon request. The Contractor is required to submit an incident report no later than 24 hours after the incident.

m. Vehicle/mechanized equipment operators are not permitted to move about the Airport, outside the designated construction area, at night unless the vehicle has operating head lights, tail lights and brake lights, or is under the escort of a

properly lighted vehicle. Head lights shall not be set on high beam when moving about the Airport at night.

n. Vehicles/mechanized equipment authorized on the Movement Area (runways, taxiways, and ramps) and/or associated safety areas shall be equipped with an electrically powered, amber color, 360-degree omni-direction light, mounted on the vehicle such that it is conspicuous from any direction.

o. At no time shall a vehicle enter the Movement Area and/or associated safety areas unless it is authorized by Airport Operations.

p. Seat belts shall be utilized on equipment/vehicles that are designed for usage.

q. The Airport may remove and impound, at the owner's expense, any vehicle/equipment which is disabled, abandoned, improperly parked, or represents an operational hazard

r. All vehicles/equipment shall be appropriately secured such that neither aircraft blast nor wind will result in their movement.

102-3.5 AOA CONTRACTOR ESCORTS AND FLAGGING.

a. The Contractor shall provide an adequate number of escorts/flaggers for material deliveries along haul routes and the movements of the Contractor's vehicles/mechanized equipment and personnel within the Movement Area and Non-Movement Areas as authorized by Airport Operations.

b. During any absence of the approved escort(s)/flagger(s) or for periods that they are unable to perform their specified duties, all work within the Movement Area and associated safety areas for projects shall stop. Additionally, all personnel and equipment shall be escorted to approved locations outside the Movement Area and related safety areas. **NO** contract time extension will be granted for time lost due to the absence of escort(s). Work shall resume only with the return of the approved escort(s).

c. The escort/flagger shall ensure that all equipment maintains proper clearances from moving aircraft.

d. For flaggers/escorts contracted through the Airport, the Contractor shall be responsible for the cost of each required flagger/escort.

102-3.6 SPECIAL CONSTRUCTION RULES ON THE AOA.

a. When airfield construction is being performed on the AOA the following rules will apply unless modified in writing by Airport Operations.

b. All construction activities on the AOA shall include a specific Construction Safety Phasing Plan (CSPP) and a Safety Plan Compliance Document (SPCD) as required by the FAA. The SPCD will address compliance to and details required by the CSPP and include any other topics of discussion that might be mentioned during the safety phase planning meeting.

c. The safety phase planning meeting shall be held prior to mobilization to the AOA.

d. Any Airport construction and/or alteration requires the Contractor to complete and submit FAA Form 7460-1 Notice of Proposed Construction or Alteration (available from the FAA Air Traffic Division Regional Office), and www.FAA.gov at least 60 days prior to the start of the project.

e. The Contractor shall complete and submit FAA Form 7460-1 for all equipment and/or temporary structures, utilized during any Airport construction and/or alteration that exceeds a height of 20 feet above ground level. This includes

1. Cranes;
2. Derricks;
3. Stockpiles of materials or equipment; and
4. Earthmoving equipment.

f. A copy of all completed FAA Form 7460-1's and the FAA's determination(s) shall be on file with the Airport prior to commencing the erection or construction of the item(s) proposed by the Contractor. The Contractor will provide Airport Operations with the FAA determination number, for internet review, or paper copy of the full determination.

g. The Contractor shall erect and maintain fencing, barricades, signs and warning devices used to delineate the perimeter of all construction areas, as approved by the Airport Airfield Operations.

h. All escorts performed within the Movement Area and/or associated safety areas, shall be provided by an authorized Escort.

i. Deliveries are to be strictly controlled (by the Contractor) using personnel specifically acquainted with these rules. The Contractor shall provide properly manned escort vehicles as required to guide and escort all deliveries to the Work Area(s).

j. At no time shall personnel, vehicles or equipment be located or enter any of the following areas unless authorized by Airport Operations.

1. Within 250 feet parallel to an active runway centerline (to be indicated on the CSPP and/or SPCD).
2. Within 400 feet parallel to an active runway centerline without equipment and stockpile removal.
3. Within 1,000 feet of the end of active runways (each end to be indicated in the CSPP and/or SPCD)
4. Within 93 feet parallel to an active taxiway centerline without proper approval.
5. Active NAVAID Critical Areas.
6. On the Movement Area and/or associated safety areas during times of inclement weather or unusual events as determined by Airport Operations. During such times all work is to be suspended. All equipment shall be removed to approved staging areas

k. Trenches and/or Excavations Trenches and/or excavations shall not be allowed in the following areas without closure or restriction of the adjacent Movement Area:

1. Within 250 feet parallel to a runway centerline.
2. Within 400 feet parallel to a runway centerline, without proper trench and excavation cover.
3. Within 93 feet parallel to a taxiway centerline without proper approval.
4. Within 1,000 feet of the end of a runway.
5. Active NAVAID Critical Areas.

l. All stockpiled material(s)/supplies shall be constrained in a manner to prevent movement resulting from aircraft blast or wind conditions. Material(s)/supplies shall not be stored within 500 feet of aircraft turning areas or movement areas. Stockpiled material(s)/supplies shall not exceed 15 feet in height unless the Contractor has complied with all requirements for airspace review and secured approval from Airport Operations. All material(s)/supplies shall be positioned so it will not obstruct the line of sight from the Control Tower to the Movement Area. Marking and lighting shall be in accordance with the requirements contained in Barricade Details Checklist.

m. Stockpile material will not be permitted within 6 feet of an AOA fence.

n. Debris, waste, and loose materials shall not be allowed on the Movement Area. If debris and/or loose materials are observed to be on active portions of the Movement Area, the Contractor will be responsible for correcting the discrepancy immediately. At the direction of Airport Operations, debris problems occurring during construction, NOT corrected by the Contractor in a timely manner, will be corrected by the Airport at the Contractor's expense. The Contractor is responsible for controlling dust problems resulting from construction and clean-up processes, as defined by Airport Operations or the Fort Lauderdale Executive Airport Engineering Division, resulting from construction and clean up processes.

102-3.7 CONSTRUCTION SITE ACCESS AND HAUL ROADS.

The Contractor will not be permitted to use any access or haul roads other than those designated on the Contract Drawings. The Contractor shall submit specific proposed ingress and egress routes associated with specific construction activities to the City for evaluation and approval prior to commencing construction activities. Aircraft Rescue and Fire Fighting (ARFF) right-of-way on access roads, haul roads, taxiways, and runways shall not be impeded at any time.

102-3.8 CONSTRUCTION NEAR NAVIGATIONAL AIDS.

Construction materials and equipment shall not be placed or parked where they may interfere with the line-of-sight of the Air Traffic Control Tower (ATCT) and navigational aids in operation. The City shall determine if any materials or equipment will cause any type of interference.

102-3.9 FINES

Contractor will be required to pay fines assessed by or to the Fort Lauderdale Executive Airport for the following:

a. Environmental penalties or fines resulting from non-compliance with local, state or federal regulations or requirements.

b. FXE, FAA or TSA fines for airport security violations.

c. FXE or FAA fines for runway incursions defined as “any occurrence at an airport involving the incorrect presence of an aircraft, vehicle, or person on the protected area of a surface designated for the landing and take-off of aircraft.”

d. FXE or FAA fines for operating on an active taxiway without proper clearance.

METHOD OF MEASUREMENT

102-4.1 Measurement for payment shall be the work under this Section completed and accepted in accordance with the Plans and these Specifications airport safety and maintenance of air operations area traffic requirements. Including but not limited to the completed and accepted Safety Plan Compliance Document.

102-4.3 Measurement of temporary fences for owl/tortoise nests for payment shall be the number of fences completed and accepted in accordance with the Plans and these Specifications.

BASIS OF PAYMENT

102-5.1 Payment for the work measured as described shall be made at the contract lump sum price bid for airport safety and maintenance of traffic, which prices and payments shall be full compensation for the work described in this section. Including but not limited to the completion and acceptance of the Safety Plan Compliance Document. Forty percent of the amount bid will be paid with the first estimate after the item is completely furnished and operational to the City’s satisfaction. The remaining sixty percent will be prorated and paid with each application for payment based on the percent of contract completion.

102-5.2 Payment for temporary fences for owl/tortoise nests shall be made at the contract price per each fence, which prices and payments shall be full compensation for furnishing all materials, equipment, labor, processes, tools, and incidental costs required to complete the work under this item.

Payment will be made under:

Item S-102-5.1	Airport Safety and Maintenance of Traffic - per lump sum
Item S-102-5.2	Temporary Fence for Owl/Tortoise Nests – per each

TAXIWAY INTERSECTION IMPROVEMENTS CITY PROJECT No. 12455

END OF ITEM S-102

ITEM S-103 PROJECT SURVEY

DESCRIPTION

103-1.1 GENERAL. Under this item, the Contractor shall do all necessary surveying and project stakeout required to construct all elements of the Project as shown on the Contract Drawings and specified in the Specifications. This shall include but not be limited to stakeout, layout and elevations for pavements, structures, forms and appurtenances as shown and required, consistent with the current practices and shall be performed by a State of Florida licensed professional land surveyor. The stakeout survey shall proceed immediately following the Notice to Proceed or as soon as authorized by the Airport Staff in accordance with the phasing of the construction and shall be expeditiously progressed to completion in a manner and at a rate satisfactory of the City. The Contractor shall keep the Resident Project Representative (RPR) fully informed as to the progress of the stakeout survey.

All survey work shall be provided under the direction of a State of Florida licensed professional land surveyor.

MATERIALS

103-2.1 All instruments, equipment, stakes and any other material necessary to perform the work satisfactorily shall be provided by the Contractor. It shall be the Contractor's responsibility to maintain these stakes in their proper position and location at all times.

CONSTRUCTION METHODS

103-3.1 The Contractor shall trim trees, brush, roots and other interfering objects from survey lines in advance of all survey work to permit accurate and unimpeded work by his stakeout survey crews.

The exact position of all work shall be established from control points, baseline transit points or other points of similar nature which are shown on the Contract Drawings and/or modified by the Engineer. Prior to any layout of works to be constructed, the Contractor shall verify the location and accuracy of all control points provided in the plans. Any error, apparent discrepancy or absence in or of data shown or required for accurately accomplishing the stakeout survey shall be referred to the RPR and Engineer for interpretation or furnishing when such is observed or required.

The Contractor shall place two offset stakes or references at each centerline full and half station and at such intermediate locations as the RPR may direct. From computations and measurements made by the Contractor, these stakes shall be clearly and legibly marked with the correct centerline full and half station number, offset and cut or fill so as to permit the establishment of the exact centerline location and elevation during construction. If markings become faded or blurred for any reason, the markings shall be restored by the Contractor at the request of the RPR. He shall locate and place all cut, fill, slope, fine grade or other stakes and points, as the engineer may direct, for the proper progress of the work. All control points shall be properly guarded and flagged for easy identification.

Drainage structures shall be staked out by the Contractor at the locations and elevations shown on

the Contract Drawings or specified by the Engineer through the RPR.

Reference points, baselines, stakes and benchmarks for stockpiles shall be established by the Contractor.

The Contractor shall be responsible for the accuracy of his work and shall maintain all reference points, stakes, etc., throughout the life of the Contract. Damaged or destroyed points, benchmarks or stakes, or any reference points made inaccessible by the progress of the construction, shall be replaced or transferred by the Contractor. Any of the above points which may be destroyed or damaged shall be transferred by the Contractor before they are damaged or destroyed. All control points shall be referenced by ties to acceptable objects and recorded. Any alterations or revisions in the ties shall be so noted and the information furnished to the RPR immediately. All stakeout survey work shall be referenced to the centerlines shown on the Contract Drawings. All computations necessary to establish the exact position of the work from control points shall be made and preserved by the Contractor. All computations, survey notes and other records shall be made available to the RPR upon request and shall become the property of the City.

The Contractor shall furnish, at his expense, all horizontal and vertical control, all staking and layout of construction work called for on the plans. The RPR, Engineer, and City shall not be responsible for such work. However, the City and Engineer reserve the right to check all said lines, grades, and measurements with their appointed surveyor. Should the City's surveyor detect errors in said lines, grades, and measurements, the contractor shall pay for all said surveying costs and subsequent surveying costs performed to verify correction of errors found in said lines, grades and measurements. Definition of an error shall be a discrepancy of ¼" or more. In the case of a discrepancy between the technical specifications and this defined tolerance, the more severe tolerance shall govern.

During the progress of the construction work, the Contractor will be required to furnish all of the surveying and stakeout incidental to the proper location by line and grade for each phase of the work. For paving and any other operation requiring extreme accuracy, the Contractor will re-stake with pins or other acceptable hubs located directly adjacent to the work at a spacing directed by the RPR.

Any existing stakes, iron pins, survey monuments or other markers defining property lines which may be disturbed during construction shall be properly tied into fixed reference points before being disturbed and accurately reset in their proper position upon completion of the work.

Just prior to completion of the Contract, the Contractor shall reestablish, if necessary, and retie all control points as permanently as possible and to the satisfaction of the RPR.

103-3.2 AS-BUILT SURVEY. Upon completion of the work, after Substantial Completion and before Final Acceptance, the Contractor shall supply to the RPR a complete as-built survey of the entire project site including drainage structures and utilities. All survey points, including horizontal and vertical control, property corners, section corner and reference (hereinafter referred to as "survey point") shall be clearly marked and referenced prior to construction. These survey points must be sufficiently referenced so that they can be reestablished after construction if they are disturbed. All survey data shall be state plane coordinates, NAD 83 datum and NADV 88.

This as-built survey will be a complete topographic and physical features survey of the entire project site surrounded by the limits of construction plus and additional 10' beyond the limits of construction

in all directions. Elevations shall be obtained on all rigid pavement joint intersections and ends. If any work is done outside the limits of construction for any reason, this limit of survey will be increased to include this area plus 25'. This survey shall be certified by a Florida Licensed Professional Land Surveyor as meeting the minimum Technical Standards for topographic surveys as set forth in chapter 21HH-6, Florida Administrative Code. The survey data must be supplied as a signed and sealed drawing (22" x 34" maximum size) at a minimum scale of 1"=50' and be electronically submitted in AutoCad on CD-ROM media. Signed and sealed copies of all field notes, sketches and calculations must be submitted concurrently with the as-built survey. Larger scale details shall be provided to clarify any complicated or complex areas. A separate point database file shall be electronically submitted in TXT or ASCII format, with each point on a single row with comma delimited columns with data ordered as follows: point number, northing, easting, elevation, description.

The as-built survey is to be supplied to the RPR for review and approval not more than thirty (30) calendar days after substantial completion for the project has been given. If the acceptable as-built survey is not supplied within the required time, the City reserves the right to perform the required survey and bill the Contractor for this work.

The as-built survey shall include all information needed to complete all project permit (i.e. SWFWMD, etc …) as required by the permits and/or agencies standard requirements. A minimum of six (6) signed and sealed copies of the as-built survey will be supplied to the Engineer and RPR.

METHOD OF MEASUREMENT

103-4.1 Payment will be made at the lump sum price bid for this item.

BASIS OF PAYMENT

103-5.1 The lump sum price bid shall include the cost of furnishing all labor, equipment, instruments and all other material necessary to satisfactorily complete the Project stakeout and as built survey. Seventy-five percent (75%) of this item will be paid based on the percentage of work paid for a month vs. the total project cost. The remaining twenty-five percent (25%) will be paid after the as-built survey has been given the RPR and approved.

This item will not be increased or decreased base on changes to the total contract amount.

Payment will be made under:

Item S-103-5.1	Project Survey and Stakeout – per Lump Sum

END OF ITEM S-103

ITEM P-101 PREPARATION/REMOVAL OF EXISTING PAVEMENTS

DESCRIPTION

101-1 This item shall consist of preparation of existing pavement surfaces for overlay, surface treatments, removal of existing pavement, ***hauling and disposal and stockpiling of demolished material*** and other miscellaneous items. The work shall be accomplished in accordance with these specifications and the applicable plans.

EQUIPMENT AND MATERIALS

101-2 All equipment and materials shall be specified here and in the following paragraphs or approved by the Resident Project Representative (RPR). The equipment shall not cause damage to the pavement to remain in place.

CONSTRUCTION

101-3.1 Removal of existing pavement.

The Contractor's removal operation shall be controlled to not damage adjacent pavement structure, and base material, cables, utility ducts, pipelines, or drainage structures which are to remain under the pavement.

~~**a. Concrete pavement removal.** Full depth saw cuts shall be made perpendicular to the slab surface. The Contractor shall saw through the full depth of the slab including any dowels at the joint, removing the pavement and installing new dowels as shown on the plans and per the specifications. Where the perimeter of the removal limits is not located on the joint and there are no dowels present, the perimeter shall be saw cut the full depth of the pavement. The pavement inside the saw cut shall be removed by methods which will not cause distress in the pavement which is to remain in place. If the material is to be wasted on the airport site, it shall be reduced to a maximum size of **one cubic foot**. Concrete slabs that are damaged by under breaking shall be repaired or removed and replaced as directed by the RPR.~~

~~The edge of existing concrete pavement against which new pavement abuts shall be protected from damage at all times. Spall and underbreak repair shall be in accordance with the plans. Any underlaying material that is to remain in place, shall be recompacted and/or replaced as shown on the plans. Adjacent areas damaged during repair shall be repaired or replaced at the Contractor's expense.~~

b. Asphalt pavement removal. Asphalt pavement to be removed shall be cut to the ***depths at the locations shown on the plans. The underlying material adjacent to the edge of and under the existing pavement which is to remain in place shall be protected from damage or disturbance during removal operations and until placement of new pavement or shaped as shown on the drawings or as directed by the RPR. Any material under the portion of the pavement to remain in place, which is disturbed or loses its compaction shall be carefully removed and replaced with P-610 Structural Portland Cement Concrete***

at no additional cost to the Owner. The Contractor's removal operation shall not cause damage to cables, utility ducts, pipelines, or drainage structures under the pavement. Any damage shall be repaired at the Contractor's expense. ~~full depth of the asphalt pavement around the perimeter of the area to be removed.~~ If the material is to be wasted on the airport site it shall be broken to a maximum size of **3** inches(~~mm~~).

c. Repair or removal of Base, Subbase, and/or Subgrade. All failed material including surface, base course, subbase course, and subgrade shall be removed and repaired as shown on the plans or as directed by the RPR. Materials and methods of construction shall comply with the applicable sections of these specifications. Any damage caused by Contractor's removal process shall be repaired at the Contractor's expense.

d. General. In all cases of full depth pavement removal, the Contractor shall protect and preserve the existing underdrain pipes and clean outs that are to remain. There shall be no additional cost for protecting and preserving the existing underdrain system to remain.

101-3.2 Preparation of joints and cracks prior to overlay/surface treatment. Remove all vegetation and debris from cracks to a minimum depth of 1 inch (~~25 mm~~). If extensive vegetation exists, treat the specific area with a concentrated solution of a water-based herbicide approved by the RPR. Fill all cracks greater than 1/4 inch ~~(6 mm)~~ wide) with a crack sealant per ASTM D6690. The crack sealant, preparation, and application shall be compatible with the surface treatment/overlay to be used. To minimize contamination of the asphalt with the crack sealant, underfill the crack sealant a minimum of 1/8 inch (~~3 mm~~), not to exceed ¼ inch (~~6 mm~~). Any excess joint or crack sealer shall be removed from the pavement surface.

101-3.3 Removal of Foreign Substances/contaminates prior to overlay *or* remarking . Removal of foreign substances/contaminates from existing pavement that will affect the bond of the new treatment shall consist of removal of rubber, fuel spills, oil, crack sealer, ***refer to Item P-620 for paint removal*** ~~at least 90% of paint~~, and other foreign substances from the surface of the pavement. Areas that require removal are designated on the plans and as directed by the RPR in the field during construction.

High-pressure water may be used. ~~If chemicals are used, they shall comply with the state's environmental protection regulations~~. Removal methods used shall not cause major damage to the pavement, or to any structure or utility within or adjacent to the work area. Major damage is defined as changing the properties of the pavement, removal of asphalt causing the aggregate to ravel, or removing pavement over 1/8 inch (~~3 mm~~) deep. If it is deemed by the RPR that damage to the existing pavement is caused by operational error, such as permitting the application method to dwell in one location for too long, the Contractor shall repair the damaged area without compensation and as directed by the RPR.

Removal of foreign substances shall not proceed until approved by the RPR. Water used for high-pressure water equipment shall be provided by the Contractor at the Contractor's expense. No material shall be deposited on the pavement shoulders. All wastes shall be disposed of ***off site*** in areas indicated in this specification ~~or shown on the plans~~.

101-3.4 Concrete spall or failed asphaltic concrete pavement repair.

a. Repair of concrete spalls in areas to be overlaid with asphalt. The Contractor shall repair all spalled concrete as shown on the plans or as directed by the RPR. The perimeter of the repair shall be saw cut a minimum of 2 inches (50 mm) outside the affected area and 2 inches (50 mm) deep. The deteriorated material shall be removed to a depth where the existing material is firm or cannot be easily removed with a geologist pick. The removed area shall be filled with asphalt mixture with aggregate sized appropriately for the depth of the patch. The material shall be compacted with equipment approved by the RPR until the material is dense and no movement or marks are visible. The material shall not be placed in lifts over 4 inches (100 mm) in depth. This method of repair applies only to pavement to be overlaid.

b. Asphalt pavement repair. The Contractor shall repair all spalled ***asphalt*** concrete as shown on the plans or as directed by the RPR. The failed areas shall be removed as specified in paragraph 101-3.1b. All failed material including surface, base course, subbase course, and subgrade shall be removed. Materials and methods of construction shall comply with the applicable sections of these specifications.

101-3.5 Cold milling. Milling shall be performed with a power-operated milling machine or grinder, capable of producing a uniform finished surface. The milling machine or grinder shall operate without tearing or gouging the underlaying surface. The milling machine or grinder shall be equipped with grade and slope controls, and a positive means of dust control. All millings shall be removed and disposed off Airport. If the Contractor mills or grinds deeper or wider than the plans specify, the Contractor shall replace the material removed with new material at the Contractor's Expense. ***All existing utility structures within the milling area shall be preserved and protected throughout construction. Any damage to the exiting utility structures shall be repaired at the cost of the Contractor. Where the limits of milled pavements abut pavement to remain, the contractor shall neatly sawcut, vertically to the specified depth of overlay in accordance with the details on the plans. In areas that become overmilled due to poor quality control, the Contractor fill with P-401 at no additional cost to the Owner.***

a. Patching. The milling machine shall be capable of cutting a vertical edge without chipping or spalling the edges of the remaining pavement and it shall have a positive method of controlling the depth of cut. The RPR shall layout the area to be milled with a straightedge in increments of 1-foot (30 cm) widths. The area to be milled shall cover only the failed area. Any excessive area that is milled because the Contractor doesn't have the appropriate milling machine, or areas that are damaged because of his negligence, shall be repaired by the Contractor at the Contractor's Expense.

b. Profiling, grade correction, or surface correction. The milling machine shall have a minimum width of 7 feet ([2] m) and it shall be equipped with electronic grade control devices that will cut the surface to the grade specified. The tolerances shall be maintained within +0 inch and -1/4 inch (+0 mm and -6mm) of the specified grade. The machine must cut vertical edges and have a positive method of dust control. The machine must have the ability to remove the millings or cuttings from the pavement and load them into a truck. All millings shall be removed and disposed of off the airport.

At the completion of milling, the RPR shall review the milled surface for scabbing or excessive smoothness. Such areas shall be scarified or re-mill to a slightly deeper depth to produce a sound and textured surface at no additional expense.

c. Clean-up. The Contractor shall sweep the milled surface daily and immediately after the milling until all residual materials are removed from the pavement surface. Prior to paving, the Contractor shall wet down the milled pavement and thoroughly sweep and/or blow the surface to remove loose residual material. Waste materials shall be collected and removed from the pavement surface and adjacent areas by sweeping or vacuuming. Waste materials shall be removed and disposed off Airport property

101-3.6. Preparation of asphalt pavement surfaces prior to surface treatment. Existing asphalt pavements to be treated with a surface treatment shall be prepared as follows:

a. Patch asphalt pavement surfaces that have been softened by petroleum derivatives or have failed due to any other cause. Remove damaged pavement to the full depth of the damage and replace with new asphalt pavement similar to that of the existing pavement in accordance with paragraph 101-3.4b.

b. Repair joints and cracks in accordance with paragraph 101-3.2.

c. Remove oil or grease that has not penetrated the asphalt pavement by scrubbing with a detergent and washing thoroughly with clean water. After cleaning, treat these areas with an oil spot primer.

d. Clean pavement surface immediately prior to placing the surface treatment so that it is free of dust, dirt, grease, vegetation, oil or any type of objectionable surface film.

101-3.7 Maintenance. The Contractor shall perform all maintenance work necessary to keep the pavement in a satisfactory condition until the full section is complete and accepted by the RPR. The surface shall be kept clean and free from foreign material. The pavement shall be properly drained at all times. If cleaning is necessary or if the pavement becomes disturbed, any work repairs necessary shall be performed at the Contractor's expense.

~~**101-3.8 Preparation of Joints in Rigid Pavement prior to resealing.** Prior to application of sealant material, clean and dry the joints of all scale, dirt, dust, old sealant, curing compound, moisture and other foreign matter. The Contractor shall demonstrate, in the presence of the RPR, that the method used cleans the joint and does not damage the joint.~~

~~**101-3.8.1 Removal of Existing Joint Sealant**. All existing joint sealants will be removed by plowing or use of hand tools. Any remaining sealant and or debris will be removed by use of wire brushes or other tools as necessary. Resaw joints removing no more than 1/16 inch (2 mm) from each joint face. Immediately after sawing, flush out joint with water and other tools as necessary to completely remove the slurry.~~

~~**101-3.8.2 Cleaning prior to sealing**. Immediately before sealing, joints shall be cleaned by removing any remaining laitance and other foreign material. Allow sufficient time to dry out joints prior to sealing. Joint surfaces will be surface-dry prior to installation of sealant.~~

~~**101-3.8.3 Joint sealant.** Joint material and installation will be in accordance with Item P-605~~

~~**101-3.9 Preparation of Cracks in Flexible Pavement prior to sealing.** Prior to application of sealant material, clean and dry the joints of all scale, dirt, dust, old sealant, curing compound, moisture and other foreign matter. The Contractor shall demonstrate, in the presence of the RPR, that the method used cleans the cracks and does not damage the pavement.~~

~~**101-3.9.1 Preparation of Crack**. Widen crack with router random by removing a minimum of 1/16 inch (2 mm) from each side of crack. Immediately before sealing, cracks will be blown out with a hot air lance combined with oil and water-free compressed air.~~

~~**101-3.9.2 Removal of Existing Crack Sealant**. Existing sealants will be removed b routing. Following routing ny remaining debris will be removed by use of a hot lance combined with oil and water-free compressed air.~~

~~**101-3.9.3 Crack Sealant.** Crack sealant material and installation will be in accordance with **[** Item P-605 **]**.~~

101-3.9.4 Removal of Pipe and other Buried Structures.

a. Removal of Existing Pipe Material. Remove the types of pipe as indicated on the plans. The pipe material shall be legally disposed of off-site in a timely manner following removal. Trenches shall be backfilled with material equal to or better in quality than adjacent embankment. Trenches under paved areas must be compacted to 95% of ASTM D1557 D698.

~~**b. Removal of Inlets/Manholes.** Where indicated on the plans or as directed by the RPR, inlets and/or manholes shall be removed and legally disposed of off-site in a timely fashion after removal. Excavations after removal shall be backfilled with material equal or better in quality than adjacent embankment. When under paved areas must be compacted to 95% of ASTM D1557, when outside of paved areas must be compacted to 95% of ASTM D698.~~

METHOD OF MEASUREMENT

~~**[101-4.1 Lump sum**. No separate measurement for payment will be made. The work covered by this section shall be considered as a subsidiary obligation of the Contractor and covered under the other contract items. **]**~~

101-4.1 Pavement removal. The unit of measurement for pavement removal shall be the number of square yards ~~(square meters)~~ removed by the Contractor. Any pavement removed outside the limits of removal because the pavement was damaged by negligence on the part of the Contractor shall not be included in the measurement for payment. No direct measurement or payment shall be made for saw cutting. Saw cutting shall be incidental to pavement removal. Dowel bar installation shall be incidental to pavement removal.

~~**101-4.2 Joint and crack repair**. The unit of measurement for joint and crack repair shall be the linear foot (meter) of joint ***or crack***.~~

~~**101-4.3 Removal of Foreign Substances/contaminates**. The unit of measurement for foreign Substances/contaminates removal shall be the square foot (meter).~~

~~**101-4.4 Spalled and failed asphalt pavement repair.** The unit of measure for failed asphalt pavement repair shall be square foot (square meter).~~

~~**101-4.5 Concrete Spall Repair.** The unit of measure for concrete spall repair shall be the number of square feet (square meter). The location and average depth of the patch shall be determined and agreed upon by the RPR and the Contractor.~~

101-4.6 Cold milling. The unit of measure for cold milling shall be ***specified depth*** ~~inches~~ of milling per square yard ~~(square meter)~~. The location and average depth of the cold milling shall be as shown on the plans ***and confirmed in the field by the RPR prior to the work beginning***. If the initial cut does not correct the condition, the Contractor shall re-mill the area

and will be paid for the total depth of milling. ***At the completion of milling, the RPR and Engineer shall review the milled surface for scabbing or excessive smoothness. Such areas shall be re-mill to a slightly deeper depth to produce a sound and textured surface at no additional expense.***

~~**101-4.7 Removal of Pipe Material *and other Buried Structures*.** Remove the types of pipe as indicated on the plans. The pipe material shall be legally disposed of off-site in a timely manner following removal. Trenches shall be backfilled with material equal to or better in quality than adjacent embankment. Trenches under paved areas must be compacted to 95% of ASTM D1557.~~

BASIS OF PAYMENT

101-5.1 Full Depth Asphalt Pavement Removal. Payment shall be made at contract unit price for the unit of measurement as specified above. This price shall be full compensation for furnishing all materials and for all preparation, hauling, and placing of the material and for all labor, equipment, tools, and incidentals necessary to complete this item. ***Full depth pavement removal thicknesses shown on the plans is 6 inces. Actual thickness may vary. The Contractor shall account for varying full depths in the unit cost of the bid. No additional compensation shall be made to the Contractor for full depth pavement removal for pavements having thicknesses greater than shown on the plans. Electrical cans and conduit (with or without encasement) within the limits of full depth pavement removal shall be considered incidental. Pavement tie-ins as shown on the contract drawings are considered incidental to full depth pavement removal.***

101-5.2 Bituminous Pavement Cold Milling. Payment shall be made at contract unit price per square yard of bituminous pavement milling. This price shall be full compensation for furnishing all materials and for all preparation, hauling, and placing of the material and for all labor, equipment, tools, and incidentals necessary to complete this item including off-site disposal of materials. The milling required for the installation and removal of temporary asphalt transitions ramps shall not be measured separately but shall be considered incidental to the overall paving operation.

Item P-101-5.1	***Full Depth Asphalt Pavement Removal – per Square Yard***
Item P-101-5.2	***Bituminous Pavement Milling (up to 2” deep) – per Square Yard***

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

Advisory Circulars (AC)

AC 150/5380-6	Guidelines and Procedures for Maintenance of Airport Pavements.

ASTM International (ASTM)

ASTM D6690	Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements

TAXIWAY INTERSECTION IMPROVEMENTS CITY PROJECT No. 12455

END OF ITEM P-101

ITEM P-151 CLEARING AND GRUBBING

DESCRIPTION

151-1.1 This item shall consist of clearing or clearing and grubbing, including the disposal of materials, for all areas within the limits designated on the plans or as required by the Resident Project Representative (RPR).

~~**a. Clearing** shall consist of the cutting and removal of all trees, stumps, brush, logs, hedges, the removal of fences and other loose or projecting material from the designated areas. The grubbing of stumps and roots will not be required.~~

b. Clearing and grubbing shall consist of clearing the surface of the ground of the designated areas of all trees, stumps, down timber, logs, snags, brush, undergrowth, hedges, heavy growth of grass or weeds, fences, structures ***not identified under P-101***, debris, and rubbish of any nature, natural obstructions or such material which in the opinion of the RPR is unsuitable for the foundation of strips, pavements, or other required structures, including the grubbing of stumps, roots, matted roots, foundations, and the disposal from the project of all spoil materials resulting from clearing and grubbing.

~~**c. Tree Removal.** Tree Removal shall consist of the cutting and removal of isolated single trees or isolated groups of trees, and the grubbing of stumps and roots. The removal of all the trees of this classification shall be in accordance with the requirements for the particular area being cleared.~~

CONSTRUCTION METHODS

151-2.1 General. The areas denoted on the plans to be cleared and grubbed shall be staked on the ground by the Contractor as indicated on the plans.

The removal of existing structures and utilities required to permit orderly progress of work shall be accomplished by local agencies, unless otherwise shown on the plans. Whenever a telephone pole, pipeline, conduit, sewer, roadway, or other utility is encountered and must be removed or relocated, the Contractor shall advise the RPR who will notify the proper local authority or owner to secure prompt action.

151-2.1.1 Disposal. All materials removed by clearing or by clearing and grubbing shall be disposed of outside the Airport's limits at the Contractor's responsibility, except when otherwise directed by the RPR. As far as practicable, waste concrete and masonry shall be placed on slopes of embankments or channels. When embankments are constructed of such material, this material shall be placed in accordance with requirements for formation of embankments. Any broken concrete or masonry that cannot be used in construction and all other materials not considered suitable for use elsewhere, shall be disposed of by the Contractor. In no case, shall any discarded materials be left in windrows or piles adjacent to or within the airport limits. The manner and location of disposal of materials shall be subject to the approval of the RPR and shall not create an unsightly or objectionable view. When the Contractor is required to locate a disposal area outside the airport property limits, the Contractor shall obtain and file with the

RPR permission in writing from the property owner for the use of private property for this purpose.

151-2.1.2 Blasting. Blasting shall not be allowed.

~~**151-2.2 Clearing.** The Contractor shall clear the staked or indicated area of all materials as indicated on the plans. Trees unavoidably falling outside the specified clearing limits must be cut up, removed, and disposed of in a satisfactory manner. To minimize damage to trees that are to be left standing, trees shall be felled toward the center of the area being cleared. The Contractor shall preserve and protect from injury all trees not to be removed. The trees, stumps, and brush shall be cut flush with the original ground surface. The grubbing of stumps and roots will not be required.~~

~~Fences shall be removed and disposed of as directed by the RPR. Fence wire shall be neatly rolled and the wire and posts stored on the airport if they are to be used again, or stored at a location designated by the RPR if the fence is to remain the property of a local owner or authority~~.

151-2.3 Clearing and grubbing. In areas designated to be cleared and grubbed, all stumps, roots, buried logs, brush, grass, and other unsatisfactory materials as indicated on the plans, shall be removed, except where embankments exceeding 3-1/2 feet (~~105 cm~~) in depth will be constructed outside of paved areas. For embankments constructed outside of paved areas, all unsatisfactory materials shall be removed, but sound trees, stumps, and brush can be cut off flush with the original ground and allowed to remain. Tap roots and other projections over 1-1/2 inches (~~38 mm~~) in diameter shall be grubbed out to a depth of at least 18 inches (~~0.5 m~~) below the finished subgrade or slope elevation.

Any buildings and miscellaneous structures that are shown on the plans to be removed shall be demolished or removed, and all materials shall be disposed of by removal from the site. The cost of removal is incidental to this item. The remaining or existing foundations, wells, cesspools, and like structures shall be destroyed by breaking down the materials of which the foundations, wells, cesspools, etc., are built to a depth at least 2 feet (~~60 cm~~) below the existing surrounding ground. Any broken concrete, blocks, or other objectionable material that cannot be used in backfill shall be removed and disposed of at the Contractor's expense. The holes or openings shall be backfilled with acceptable material and properly compacted.

All holes in embankment areas remaining after the grubbing operation shall have the sides of the holes flattened to facilitate filling with acceptable material and compacting as required in Item P-152. The same procedure shall be applied to all holes remaining after grubbing in areas where the depth of holes exceeds the depth of the proposed excavation.

METHOD OF MEASUREMENT

151-3.1 ~~The quantities of clearing and grubbing as shown by the limits on the plans shall be the number of acres (square meters) or fractions thereof of land specifically cleared and grubbed.~~ ***No separate measurement for payment shall be made for the quantity of Clearing and Grubbing.***

BASIS OF PAYMENT

151-4.1 ~~Payment shall be made at the contract unit price per acre (square meter) for clearing and grubbing. This price shall be full compensation for furnishing all materials and for all labor, equipment, tools, and incidentals necessary to complete the item.~~ ***No payment will be made separately or directly for the Clearing and Grubbing. Cost will be incidental to P-152 Excavation, Subgrade, and Embankment.***

END OF ITEM P-151

ITEM P-152 EXCAVATION, SUBGRADE, AND EMBANKMENT

DESCRIPTION

152-1.1 This item covers excavation, disposal, placement, and compaction of all materials within the limits of the work required to construct safety areas, runways, taxiways, aprons, and intermediate areas as well as other areas for drainage, building construction, parking, or other purposes in accordance with these specifications and in conformity to the dimensions and typical sections shown on the plans.

152-1.2 All suitable material taken from excavation areas located on site shall be used in the formation of embankment, subgrade, and for back filling of areas as indicated on the project plans or as directed by the Resident Project Representative (RPR). No suitable material shall be removed from the site without the written approval of the RPR.

152.1.3 When the volume of the excavation of suitable material, soil group A-3 or better, exceeds that required to construct the embankments to the grades indicated, the excess shall be stockpiled on the airport in the contractor's staging area or spread in other locations as directed by the RPR at no additional cost. Material placed outside the staging area will be neatly spread and graded at no additional cost. If the volume of excavation is not sufficient for constructing the embankment to the grades indicated from material within the project limits, whether moved by equipment or not, the deficiency shall be supplied from off-site borrow locations supplied by the Contractor.

152-1.2 Classification. All material excavated shall be classified as defined below:

a. Unclassified excavation. Unclassified excavation shall consist of the excavation and disposal of all material, regardless of its nature which is not otherwise classified and paid for under one of the following items**.**

b. Borrow excavation. Borrow excavation shall consist of approved material required for the construction of embankments or for other portions of the work in excess of the quantity of usable material available from required excavations. Borrow material shall be obtained from areas ~~designated by the Resident Project Representative (RPR) within the limits of the airport property but outside the normal limits of necessary grading, or from areas~~ outside the airport boundaries.

c. Utility soft dig. Utility soft dig will consist of pot holing utilities at the locations as indicated on the Contract Documents and/or directed by the RPR.

152-1.3 Unsuitable excavation. Unsuitable material shall be disposed in designated waste areas as shown on the plans. Materials containing vegetable or organic matter, such as muck, peat, organic silt, or sod shall be considered unsuitable for use in embankment construction. Material suitable for topsoil may be used on the embankment slope ***outside of paved areas when approved by the RPR, otherwise it shall be removed from the airport at no additional cost*** when approved by the RPR.

CONSTRUCTION METHODS

152-2.1 General. Before beginning excavation, grading, and embankment operations in any area, the area shall be cleared or cleared and grubbed in accordance with Item P-151.

The suitability of material to be placed in embankments shall be subject to approval by the RPR. All unsuitable material shall be disposed of as described above. ~~in waste areas as shown on the plans. All waste areas shall be graded to allow positive drainage of the area and adjacent areas. The surface elevation of waste areas shall be specified on the plans or approved by the RPR.~~

When the Contractor's excavating operations encounter artifacts of historical or archaeological significance, the operations shall be temporarily discontinued and the RPR notified per Section 70, paragraph 70-20. At the direction of the RPR, the Contractor shall excavate the site in such a manner as to preserve the artifacts encountered and allow for their removal. Such excavation will be paid for as extra work.

Areas outside the limits of the pavement areas where the top layer of soil has become compacted by hauling or other Contractor activities shall be scarified and disked to a depth of 4 inches (~~100 mm~~), to loosen and pulverize the soil. Stones or rock fragments larger than 4 inches (~~100 mm~~) in their greatest dimension will not be permitted in the top 6 inches (~~150 mm~~) of the subgrade.

If it is necessary to interrupt existing surface drainage, sewers or under-drainage, conduits, utilities, or similar underground structures, the Contractor shall be responsible for and shall take all necessary precautions to preserve them or provide temporary services. When such facilities are encountered, the Contractor shall notify the RPR, who shall arrange for their removal if necessary. The Contractor, at their own expense, shall satisfactorily repair or pay the cost of all damage to such facilities or structures that may result from any of the Contractor's operations during the period of the contract.

a. Blasting. Blasting shall not be allowed.

152-2.2 Excavation. No excavation shall be started until the work has been staked out by the Contractor and the RPR has obtained from the Contractor, the survey notes of the elevations and measurements of the ground surface. The Contractor and RPR shall agree that the original ground lines shown on the original topographic mapping are accurate, or agree to any adjustments made to the original ground lines.

All areas to be excavated shall be stripped of vegetation and topsoil. Topsoil shall be stockpiled for future use in areas designated on the plans or by the RPR. All suitable excavated material shall be used in the formation of embankment, subgrade, or other purposes as shown on the plans. All unsuitable material shall be disposed of as shown on the plans.

The grade shall be maintained so that the surface is well drained at all times.

When the volume of the excavation exceeds that required to construct the embankments to the grades as indicated on the plans, the excess shall be used to grade the areas of ultimate development or disposed as directed by the RPR. When the volume of excavation is not sufficient for constructing the embankments to the grades indicated, the deficiency shall be obtained from borrow areas.

a. Selective grading. When selective grading is indicated on the plans, the more suitable material designated by the RPR shall be used in constructing the embankment or in capping the

pavement subgrade. If, at the time of excavation, it is not possible to place this material in its final location, it shall be stockpiled in approved areas until it can be placed. The more suitable material shall then be placed and compacted as specified. Selective grading shall be considered incidental to the work involved. The cost of stockpiling and placing the material shall be included in the various pay items of work involved.

b. Undercutting. Rock, shale, hardpan, loose rock, boulders, or other material unsatisfactory for safety areas, subgrades, roads, shoulders, or any areas intended for turf shall be excavated to a minimum depth of 12 inches (300 mm) below the subgrade or to the depth specified by the RPR. Muck, peat, matted roots, or other yielding material, unsatisfactory for subgrade foundation, shall be removed to the depth specified. Unsuitable materials shall be **[** disposed of at locations shown on the plans. **] [** disposed off the airport. The cost is incidental to this item. **]** This excavated material shall be paid for at the contract unit price per cubic yard (per cubic meter) for **[ ]**. The excavated area shall be backfilled with suitable material obtained from the grading operations or borrow areas and compacted to specified densities. The necessary backfill will constitute a part of the embankment. Where rock cuts are made, backfill with select material. Any pockets created in the rock surface shall be drained in accordance with the details shown on the plans. Undercutting will be paid as **[** unclassified excavation **] [** rock excavation **]**.

c. Over-break. Over-break, including slides, is that portion of any material displaced or loosened beyond the finished work as planned or authorized by the RPR. All over-break shall be graded or removed by the Contractor and disposed of as directed by the RPR. The RPR shall determine if the displacement of such material was unavoidable and their own decision shall be final. Payment will not be made for the removal and disposal of over-break that the RPR determines as avoidable. Unavoidable over-break will be classified as "Unclassified Excavation."

d. Removal of utilities. The removal of existing structures and utilities required to permit the orderly progress of work will be accomplished by the Contractor as indicated on the plans. All existing foundations shall be excavated at least 2 feet (60 cm) below the top of subgrade or as indicated on the plans, and the material disposed of as directed by the RPR. All foundations thus excavated shall be backfilled with suitable material and compacted as specified for embankment or as shown on the plans.

e. The Contractor is advised to review existing ground water elevations as shown in the supplied soil borings. Should dewatering be required to perform this work, the Contractor will accomplish the dewatering efforts in accordance with all federal, state and local requirements, including the installation of additional erosion and sediment control features as required and any required permitting. No direct or separate payment shall be made for dewatering, all costs are to be included in the unit price for the item requiring it. No additional contract time will be granted for dewatering activity. Soil borings may not show the seasonal high water table in locations. No adjustment in unit bid price will be made due to water table locations.

152-2.3 Borrow excavation. There are no borrow sources within the boundaries of the airport property. The Contractor shall locate and obtain borrow sources, subject to the approval of the RPR. The Contractor shall notify the RPR at least 15 days prior to beginning the excavation so necessary measurements and tests can be made by the RPR. All borrow pits shall be opened to expose the various strata of acceptable material to allow obtaining a uniform product. Borrow areas shall be drained and left in a neat, presentable condition with all slopes dressed uniformly. Borrow areas shall not create a hazardous wildlife attractant.

152-2.4 Drainage excavation. Drainage excavation shall consist of excavating drainage ditches including intercepting, inlet, or outlet ditches; or other types as shown on the plans. The work shall be performed in sequence with the other construction. Ditches shall be constructed prior to starting adjacent excavation operations. All satisfactory material shall be placed in embankment fills; unsuitable material shall be placed in designated waste areas or as directed by the RPR. All necessary work shall be performed true to final line, elevation, and cross-section. The Contractor shall maintain ditches constructed on the project to the required cross-section and shall keep them free of debris or obstructions until the project is accepted.

152-2.5 Preparation of cut areas or areas where existing pavement has been removed. In those areas on which a subbase or base course is to be placed, the top 12 inches of subgrade shall be compacted to not less than 100% of maximum density for non-cohesive soils, and 95% of maximum density for cohesive soils as determined by ASTM. As used in this specification, “non-cohesive" shall mean those soils having a plasticity index (PI) of less than 3 as determined by ASTM D4318.

Payment for materials removed, manipulated, and replaced in order to obtain the required depth of density shall be paid for under Unclassified Excavation or Embankment.

The Contractor shall achieve in-place field densities, for subgrade and embankments outside of areas to be paved, of 85% of maximum dry density as determined by ASTM D1557, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort. In addition, subgrade and embankments outside of areas to be paved shall be firm and unyielding under heavy vehicle traffic as demonstrated by proof-roll with a dual axle vehicle, such as a fully-loaded water truck.

152-2.6 Preparation of embankment area. All sod and vegetative matter shall be removed from the surface upon which the embankment is to be placed. The cleared surface shall be broken up by plowing or scarifying to a minimum depth of 6 inches (~~150 mm~~) and shall then be compacted per paragraph 152-2.10.

Sloped surfaces steeper than one (1) vertical to four (4) horizontal shall be plowed, stepped, benched, or broken up so that the fill material will bond with the existing material. When the subgrade is part fill and part excavation or natural ground, the excavated or natural ground portion shall be scarified to a depth of 12 inches (~~300 mm~~) and compacted as specified for the adjacent fill.

No direct payment shall be made for the work performed under this section. The necessary clearing and grubbing and the quantity of excavation removed will be paid for under the respective items of work.

152-2.7 Control Strip. The first half-day of construction of subgrade and/or embankment shall be considered as a control strip for the Contractor to demonstrate, in the presence of the RPR, that the materials, equipment, and construction processes meet the requirements of this specification. The sequence and manner of rolling necessary to obtain specified density requirements shall be determined. The maximum compacted thickness may be increased to a maximum of 12 inches (~~300 mm~~) upon the Contractor’s demonstration that approved equipment and operations will uniformly compact the lift to the specified density. The RPR must witness this demonstration and approve the lift thickness prior to full production.

Control strips that do not meet specification requirements shall be reworked, re-compacted, or removed and replaced at the Contractor's expense. Full operations shall not begin until the control strip has been accepted by the RPR. The Contractor shall use the same equipment, materials, and construction methods for the remainder of construction, unless adjustments made by the Contractor are approved in advance by the RPR.

152-2.8 Formation of embankments. The material shall be constructed in lifts as established in the control strip, but not less than 6 inches (~~150 mm~~) nor more than 12 inches (~~300 mm~~) of compacted thickness.

When more than one lift is required to establish the layer thickness shown on the plans, the construction procedure described here shall apply to each lift. No lift shall be covered by subsequent lifts until tests verify that compaction requirements have been met. The Contractor shall rework, re-compact and retest any material placed which does not meet the specifications.

The lifts shall be placed, to produce a soil structure as shown on the typical cross-section or as directed by the RPR. Materials such as brush, hedge, roots, stumps, grass and other organic matter, shall not be incorporated or buried in the embankment.

Earthwork operations shall be suspended at any time when satisfactory results cannot be obtained due to rain, freezing, or other unsatisfactory weather conditions in the field. Frozen material shall not be placed in the embankment nor shall embankment be placed upon frozen material. Material shall not be placed on surfaces that are muddy, frozen, or contain frost. The Contractor shall drag, blade, or slope the embankment to provide surface drainage at all times.

The material in each lift shall be within ±2% of optimum moisture content before rolling to obtain the prescribed compaction. The material shall be moistened or aerated as necessary to achieve a uniform moisture content throughout the lift. Natural drying may be accelerated by blending in dry material or manipulation alone to increase the rate of evaporation.

The Contractor shall make the necessary corrections and adjustments in methods, materials or moisture content to achieve the specified embankment density.

The RPR will take samples of excavated materials which will be used in embankment for testing and develop a Moisture-Density Relations of Soils Report (Proctor) in accordance with ASTM D698 or D 1557. A new Proctor shall be developed for each soil type based on visual classification.

Density tests will be taken by the RPR for every 1,000 square yards of compacted embankment for each lift which is required to be compacted, or other appropriate frequencies as determined by the RPR.

If the material has greater than 30% retained on the 3/4-inch (~~19.0 mm~~) sieve, follow AASHTO T-180 Annex Correction of maximum dry density and optimum moisture for oversized particles.

Rolling operations shall be continued until the embankment is compacted per paragraph 152-2.5.

On all areas outside of the pavement areas, no compaction will be required on the top 4 inches (~~100 mm~~) which shall be prepared for ***sod in accordance with T-904 or*** a seedbed in accordance with ***S-906.***

The in-place field density shall be determined in accordance with ASTM D1556 or ASTM 6938 using Procedure A, the direct transmission method, and ASTM D6938 shall be used to determine the moisture content of the material. The machine shall be calibrated in accordance with ASTM D6938. The Contractor's laboratory shall perform all density tests in the RPR's presence and provide the test results upon completion to the RPR for acceptance. If the specified density is not attained, the area represented by the test or as designated by the RPR shall be reworked and/or re-compacted and additional random tests made. This procedure shall be followed until the specified density is reached.

Compaction areas shall be kept separate, and no lift shall be covered by another lift until the proper density is obtained.

During construction of the embankment, the Contractor shall route all construction equipment evenly over the entire width of the embankment as each lift is placed. Lift placement shall begin in the deepest portion of the embankment fill. As placement progresses, the lifts shall be constructed approximately parallel to the finished pavement grade line.

When rock, concrete pavement, asphalt pavement, and other embankment material are excavated at approximately the same time as the subgrade, the material shall be incorporated into the outer portion of the embankment and the subgrade material shall be incorporated under the future paved areas. Stones, fragmentary rock, and recycled pavement larger than 4 inches (~~100 mm~~) in their greatest dimensions will not be allowed in the top 12 inches (~~300 mm~~) of the subgrade. Rockfill shall be brought up in lifts as specified or as directed by the RPR and the finer material shall be used to fill the voids forming a dense, compact mass. Rock, cement concrete pavement, asphalt pavement, and other embankment material shall not be disposed of except at places and in the manner designated on the plans or by the RPR.

When the excavated material consists predominantly of rock fragments of such size that the material cannot be placed in lifts of the prescribed thickness without crushing, pulverizing or further breaking down the pieces, such material may be placed in the embankment as directed in lifts not exceeding 2 feet (~~60 cm~~) in thickness. Each lift shall be leveled and smoothed with suitable equipment by distribution of spalls and finer fragments of rock. The lift shall not be constructed above an elevation 4 feet (~~1.2 m~~) below the finished subgrade.

There will be no separate measurement of payment for compacted embankment. All costs incidental to placing in lifts, compacting, discing, watering, mixing, sloping, and other operations necessary for construction of embankments will be included in the contract price for excavation, borrow, or other items.

152-2.9 Proof rolling. The purpose of proof rolling the subgrade is to identify any weak areas in the subgrade and not for compaction of the subgrade. After compaction is completed, the subgrade area shall be proof rolled with a **15** ton Proof Roller with tires spaced not more than 32 inches (~~0.8 m~~) on-center with tires inflated to 125 psi in the presence of the RPR. Apply a minimum of **50%** coverage, or as specified by the RPR, under pavement areas. A coverage is defined as the application of one tire print over the designated area. Soft areas of subgrade that deflect more than 1 inch (~~25 mm~~) or show permanent deformation greater than 1 inch (~~25 mm~~) shall be removed and replaced with suitable material or reworked to conform to the moisture content and compaction requirements in accordance with these specifications. Removal and replacement of soft areas is incidental to this item.

152-2.10 Compaction requirements.

The subgrade under areas to be paved shall be compacted ~~to a depth of 12 inches (300 mm) and to a density of not less than 100 percent of the maximum dry density as determined by ASTM D1557.~~ ***to the depths and percentages shown in the compaction schedule noted in the plans. Density will be determined in accordance with ASTM D1557.*** The subgrade in areas outside the limits of the pavement areas shall be compacted to a depth of 12 inches and to a density of not less than 95 percent of the maximum density as determined by ASTM D1557.

The material to be compacted shall be within ±2% of optimum moisture content before being rolled to obtain the prescribed compaction (except for expansive soils). When the material has greater than 30 percent retained on the ¾ inch (19.0 mm) sieve, follow the methods in ASTM D1557**.** Tests for moisture content and compaction will be taken at a minimum of **1,000** S.Y. of subgrade. All quality assurance testing shall be done by the RPR.

The in-place field density shall be determined in accordance with ASTM D1556 **or** ASTM D6938 using Procedure A, the direct transmission method, and ASTM D6938 shall be used to determine the moisture content of the material. The machine shall be calibrated in accordance with ASTM D6938 within 12 months prior to its use on this contract. The gage shall be field standardized daily.

Density tests will be taken by the RPR for every **1,000** square yards) ~~(meters)~~ of completed subgrade. If a nuclear gage is used for density determination, two random readings shall be made for each **2,000** square yards (~~meters~~).

Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

If the specified density is not attained, the entire lot shall be reworked and/or re-compacted and additional random tests made. This procedure shall be followed until the specified density is reached.

All cut-and-fill slopes shall be uniformly dressed to the slope, cross-section, and alignment shown on the plans or as directed by the RPR and the finished subgrade shall be maintained.

WARNING! A ductile iron raw watermain is located on the south side of the project – see plans for locations. Vibratory rolling will not be permitted within 10' of this pipe.

152-2.11 Finishing and protection of subgrade. Finishing and protection of the subgrade is incidental to this item. Grading and compacting of the subgrade shall be performed so that it will drain readily. All low areas, holes or depressions in the subgrade shall be brought to grade. Scarifying, blading, rolling and other methods shall be performed to provide a thoroughly compacted subgrade shaped to the lines and grades shown on the plans. All ruts or rough places that develop in the completed subgrade shall be graded, re-compacted, and retested. The Contractor shall protect the subgrade from damage and limit hauling over the finished subgrade to only traffic essential for construction purposes.

The Contractor shall maintain the completed course in satisfactory condition throughout placement of subsequent layers. No subbase, base, or surface course shall be placed on the subgrade until the subgrade has been accepted by the RPR.

152-2.12 Haul. All hauling will be considered a necessary and incidental part of the work. The Contractor shall include the cost in the contract unit price for the pay of items of work involved. No payment will be made separately or directly for hauling on any part of the work.

The Contractor's equipment shall not cause damage to any excavated surface, compacted lift or to the subgrade as a result of hauling operations. Any damage caused as a result of the Contractor's hauling operations shall be repaired at the Contractor's expense.

The Contractor shall be responsible for providing, maintaining and removing any haul roads or routes within or outside of the work area, and shall return the affected areas to their former condition, unless otherwise authorized in writing by the Owner. No separate payment will be made for any work or materials associated with providing, maintaining and removing haul roads or routes.

152-2.13 Surface Tolerances. In those areas on which a subbase or base course is to be placed, the surface shall be tested for smoothness and accuracy of grade and crown. Any portion lacking the required smoothness or failing in accuracy of grade or crown shall be scarified to a depth of at least 3 inches (~~75 mm~~), reshaped and re-compacted to grade until the required smoothness and accuracy are obtained and approved by the RPR. The Contractor shall perform all final smoothness and grade checks in the presence of the RPR. Any deviation in surface tolerances shall be corrected by the Contractor at the Contractor's expense.

- **a. Smoothness.** The finished surface shall not vary more than +/- ½ inch (~~12 mm~~) when tested with a 12-foot (~~3.7 m~~) straightedge applied parallel with and at right angles to the centerline. The straightedge shall be moved continuously forward at half the length of the 12-foot (~~3.7 m~~) straightedge for the full length of each line on a 50-foot (~~15 m~~) grid.
- **b. Grade.** The grade and crown shall be measured on a 50-foot (~~15 m~~) grid and shall be within +/-0.05 feet (~~15 mm~~) of the specified grade.

On safety areas, turfed areas and other designated areas within the grading limits where no subbase or base is to placed, grade shall not vary more than 0.10 feet (~~30 mm~~) from specified grade. Any deviation in excess of this amount shall be corrected by loosening, adding or removing materials, and reshaping.

152-2.14 Topsoil. ~~When topsoil is specified or required as shown on the plans or under Item T-905, it shall be salvaged from stripping or other grading operations. The topsoil shall meet the requirements of Item T-905. If, at the time of excavation or stripping, the topsoil cannot be placed in its final section of finished construction, the material shall be stockpiled at approved locations~~. ***Topsoil shall be stripped and stockpiled on site until grading is complete. Topsoil shall be placed prior to sod installation. The sod mat is assumed to be 2 inches thick.*** Stockpiles shall be located as shown on the plans and the approved CSPP, and shall not be placed on areas that subsequently will require any excavation or embankment fill. If, in the judgment of the RPR, it is practical to place the salvaged topsoil at the time of excavation or stripping, the material shall be placed in its final position without stockpiling or further re-handling.

~~Upon completion of grading operations, stockpiled topsoil shall be handled and placed as shown on the plans and as required in Item T-905. Topsoil shall be paid for as provided in Item T-905. No direct payment will be made for topsoil under Item P-152.~~

All work associated with the removal, stockpiling and rehandling of topsoil is considered incidental to Item P-152.

152-2.15 OFFSITE BORROW. When the amount of suitable on-site excavation is not sufficient to achieve the required embankment for the project, the Contractor will supply the material from offsite borrow sites. When required, offsite borrow shall meet the following requirements. The offsite borrow sources will be the Contractor's responsibility to locate and to obtain any environmental permits, testing, hauling fees or other required incidental items to satisfy the requirements of the project. The borrow site may be visited by the RPR and any unsuitable areas or materials marked not be used for the project. The Contractor shall notify the RPR and Engineer, at least 15 days prior to beginning the borrow excavation. The borrow pit shall have a vertical face available to define the strata to be used. All materials brought to the project as borrow shall meet the following criteria to be accepted:

Soil Group	***A-3 or better***
% Passing No. 200 Sieve	***Less than 20% (By weight)***
Liquid Limit	***Less than 20***
Plasticity Index	***Less than 5***
Organic Content	***Less than 2% (By weight)***

All materials to be used for the work must have laboratory tests on file with RPR and Engineer meeting these criteria before the material can be brought onto airport property for incorporation into the project.

Any change in the sources or composition of the material will be discussed with the RPR and Engineer and laboratory tests approved prior to any change of materials.

The Contractor will be allowed to remove organic material from the project stripping by sieving or other methods and use it as borrow material assuming it meets the above requirements.

All offsite borrow will be procured from a licensed and permitted borrow pit that has completed soil testing to the extent necessary to show the fill meets the SCTLs defined in the testing protocol. Alternatively, the contractor may submit material from a non-licensed and permitted borrow pit, provided that they follow the Soil Quality Testing Protocol listed below, at no additional cost to the contract:

Soil Quality Testing Protocol

- ***A. The Contractor will test the fill to insure it meets the following soil cleanup target levels (SCTLs) as described in Table II Chapter 62-777 FAC prior to placement on airport.***
  - ***a. residential direct exposure soil cleanup target level***
  - ***b. leachability based on groundwater soil cleanup target level***
- ***B. The laboratory testing parameters for the soil are as follows:***
  - ***a. EPA Method 8260 B for Volatile Organic Compounds***
  - ***b. EPA Method 8270 D for Semi-Volatile Organic Compounds***
  - ***c. EPA Method 8081 B for Organochlorine Pesticides***
  - ***d. Arsenic, cadmium, chromium, lead, mercury, selenium and silver by appropriate EPA Methods***

C. No soil exceeding any of the soil cleanup target levels defined above is allowed to be placed on airport.

D. All laboratory testing is to be completed by a laboratory certified by the State of Florida and accredited by the NELAC Institute.

E. All soil testing is to be conducted in accordance with 2017 Florida Department of Environmental Protection (FDEP) Standard Operating Procedures (SOPs) effective 4/16/2018.

F. The number of soil samples to be collected will be based on the volume of soil generated and will be as follows:

Volume of Soil (cubic yard)	*Number of Discrete VOC Samples*	*Number of Composite Samples for no-VOC Analyses*
Less than 200	*1*	*1*
200 to 1,000	*3*	*3*
1,000 to 2,000	*5*	*5*
Each additional 1000	*1*	*1*

G. All soil sample results are to be provided to the Engineer for review prior to placement of soil on airport.

H. The Contractor shall immediately remove and dispose of any contaminated soil that is placed on airport in accordance with all applicable laws and rules.

152-2.16 Utility Soft Dig. Locate existing utilities as shown in contract documents by excavating test holes at key locations where the exact size, material type, depth, and orientation of the utilities are identified utilizing a vacuum excavation. The test hole information will then be surveyed and included in the utility drawings and submitted to the engineer.

a. contractor to provide a minimum of four test holes for each utility.

METHOD OF MEASUREMENT

152-3.1 The quantity of unclassified excavation to be paid for shall be the number of cubic yards (cubic meters) measured in its original position. Measurement shall not include the quantity of materials excavated without authorization beyond normal slope lines, or the quantity of material used for purposes other than those directed. ***No payment will be made for material "swelling".***

152-3.2 The quantity of embankment in place shall be the number of cubic yards (cubic meters) measured in its final position. ***Measurement shall not include the quantity of materials placed without authorization beyond normal slope lines, or the quantity of material used for purposes other than those directed. The Contractor is required to account, when determining project unit bid prices, that some of the existing excavated material will be "lost" during construction or may be unsuitable and will not be available for embankment construction. No payment will be made for material lost in clearing and grubbing, unsuitable material not able to be used, shrinkage of material or other reduction in material quantity.***

152-3.3 Contractor will perform a detailed pre-construction survey before any clearing and grubbing or other work begins, after excavation has been completed, and a post-construction survey once all work is completed and supply them to the RPR and Engineer. Survey will be submitted in digital terrain model (DTM) format.

BASIS OF PAYMENT

152-4.1 Unclassified excavation payment shall be made at the contract unit price per cubic yard (~~cubic meter~~). This price shall be full compensation for ***loading and hauling, soil shrinkage and swelling, rehandling of unclassified excavation, compaction,*** furnishing all materials, labor, equipment, tools, ***surveying, dewatering,*** and incidentals necessary to complete the item ***to the grades and requirements shown on the plans.***

152-4.2 For embankment, payment shall be made at the contract unit price per cubic yard (~~cubic meter~~). This price shall be full compensation for obtaining and using on-site and off-site sources, loading and hauling from borrow areas, soil shrinkage and swelling, rehandling, compaction, furnishing all materials, labor, equipment, tools, survey, and incidentals necessary to complete the item to the grades and requirements shown on the plans.

Payment will be made under:

Item P-152-4.1 Unclassified Excavation – per Cubic Yard

Item P-152-4.2 Embankment – per Cubic Yard

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

American Association of State Highway and Transportation Officials (AASHTO)

AASHTO T-180	Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop

ASTM International (ASTM)

ASTM D698	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3))
ASTM D1556	Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D1557	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2700 kN-m/m^3))
ASTM D6938	Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

Advisory Circulars (AC)

AC 150/5370-2	Operational Safety on Airports During Construction Software

Software

FAARFIELD – FAA Rigid and Flexible Iterative Elastic Layered Design

U.S. Department of Transportation

FAA RD-76-66 Design and Construction of Airport Pavements on Expansive Soils

END OF ITEM P-152

ITEM P-153 CONTROLLED LOW-STRENGTH MATERIAL (CLSM)

DESCRIPTION

153-1.1 This item shall consist of furnishing, transporting, and placing a controlled low-strength material (CLSM) as flowable backfill in trenches or at other locations shown on the plans or as directed by the Resident Project Representative (RPR).

MATERIALS

153-2.1 Materials.

a. Cement. Cement shall conform to the requirements of ASTM **150** Type **I**.

b. Fly ash. Fly ash shall conform to ASTM C618, Class C or F.

c. Fine aggregate (sand). Fine aggregate shall conform to the requirements of ASTM C33 except for aggregate gradation. Any aggregate gradation which produces the specified performance characteristics of the CLSM and meets the following requirements, will be accepted.

Sieve Size	Percent Passing by weight
3/4 inch (19.0 mm)	100
No. 200 (75 µm)	0 - 12

d. Water. Water used in mixing or curing shall be from potable water sources. Other sources shall be tested in accordance with ASTM C1602 prior to use.

MIX DESIGN

153-3.1 Proportions. The Contractor shall submit, to the RPR, a mix design including the proportions and source of aggregate, fly ash, cement, water, and approved admixtures. No CLSM mixture shall be produced for payment until the RPR has given written approval of the proportions. The proportions shall be prepared by a laboratory and shall remain in effect for the duration of the project. The proportions shall establish a single percentage or weight for aggregate, fly ash, cement, water, and any admixtures proposed. Laboratory costs are incidental to this item.

a. Compressive strength. CLSM shall be designed to achieve a 28-day compressive strength of 100 to 200 psi (~~690 to 1379 kPa~~) when tested in accordance with ASTM D4832, with no significant strength gain after 28 days.

b. Consistency. Design CLSM to achieve a consistency that will produce an approximate 8-inch (~~200 mm~~) diameter circular-type spread without segregation. CLSM consistency shall be determined per ASTM D6103.

CONSTRUCTION METHODS

153-4.1 Placement.

a. Placement. CLSM may be placed by any reasonable means from the mixing unit into the space to be filled. Agitation is required during transportation and waiting time. Placement shall be performed so structures or pipes are not displaced from their final position and intrusion of CLSM into unwanted areas is avoided. The material shall be brought up uniformly to the fill line shown on the plans or as directed by the RPR. Each placement of CLSM shall be as continuous an operation as possible. If CLSM is placed in more than one lift, the base lift shall be free of surface water and loose foreign material prior to placement of the next lift.

b. Contractor Quality Control. The Contractor shall collect all batch tickets to verify the CLSM delivered to the project conforms to the mix design. The Contractor shall verify daily that the CLSM is consistent with 153-3.1a and 153-3.1b. Adjustments shall be made as necessary to the proportions and materials as needed. The Contractor shall provide all batch tickets to the RPR.

c. Limitations of placement. CLSM shall not be placed on frozen ground. Mixing and placing may begin when the air or ground temperature is at least 35°F (2°C) and rising. Mixing and placement shall stop when the air temperature is 40°F (4°C) and falling or when the anticipated air or ground temperature will be 35°F (2°C) or less in the 24-hour period following proposed placement. At the time of placement, CLSM shall have a temperature of at least 40°F (4°C).

153-4.2 Curing and protection

a. Curing. The air in contact with the CLSM shall be maintained at temperatures above freezing for a minimum of 72 hours. If the CLSM is subjected to temperatures below 32°F (0°C), the material may be rejected by the RPR if damage to the material is observed.

b. Protection. The CLSM shall not be subject to loads and shall remain undisturbed by construction activities for a period of 48 hours or until a compressive strength of 15 psi (105 kPa) is obtained. The Contractor shall be responsible for providing evidence to the RPR that the material has reached the desired strength. Acceptable evidence shall be based upon compressive tests made in accordance with paragraph 153-3.1a.

153-4.3 Quality Assurance (QA) Acceptance. CLSM QA acceptance shall be based upon batch tickets provided by the Contractor to the RPR to confirm that the delivered material conforms to the mix design.

METHOD OF MEASUREMENT

153-5.1 Measurement.

No separate measurement for payment shall be made for controlled low strength material (CLSM). CLSM shall be considered necessary and incidental to the work of this Contract.

BASIS OF PAYMENT

153-6.1 Payment.

No payment will be made separately or directly for controlled low strength material (CLSM). CLSM shall be considered necessary and incidental to the work of this Contract.

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM C33	Standard Specification for Concrete Aggregates
ASTM C150	Standard Specification for Portland Cement
ASTM C618	Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM C595	Standard Specification for Blended Hydraulic Cements
ASTM C1602	Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete
ASTM D4832	Standard Test Method for Preparation and Testing of Controlled Low-Strength Material (CLSM) Test Cylinders
ASTM D6103	Flow Consistency of Controlled Low Strength Material (CLSM)

END OF ITEM P-153

ITEM P-154 SUBBASE COURSE

DESCRIPTION

154-1.1 This item shall consist of a subbase course composed of granular materials constructed on a prepared subgrade or underlying course in accordance with these specifications, and in conformity with the dimensions and typical cross-section shown on the plans.

MATERIALS

154-2.1 Materials. The subbase material shall consist of hard durable particles or fragments of granular aggregates The material may be obtained from ***blending in situ materials with P-211 Lime Rock,*** gravel pits, stockpiles, or may be produced from a crushing and screening plant with proper blending. The materials from these sources shall meet the requirements for gradation, quality, and consistency. The material shall be free from vegetative matter, excessive amounts of clay, and other objectionable substances; uniformly blended; and be capable of being compacted into a dense, stable subbase.

The subbase material shall exhibit a California Bearing Ratio (CBR) value of at least 20 when tested in accordance with ASTM D1883. The subbase material shall meet the gradation specified in the table below.

Subbase Gradation Requirements

Sieve designation	**Percentage by weight passing sieves**		**Contractor's Final Gradation**	**Job Control Grading Band Tolerances[1] (Percent)**
	Subbase Aggregate	**~~Recycled pavement (RAP or RCO)~~**		
3 inch (75 mm)	100			0
1 1/2 inch (37.5 mm)		~~100~~		0
3/4 inch (19.0 mm)	70-100	~~70-100~~		±10
No. 10 (2.00 mm)	20-100	~~20-100~~		±10
No. 40 (425 µm)	5-60	~~5-60~~		±5
No. 200 (75 µm)	0-15	~~[0-15]~~		±5

[1]The "Job Control Grading Band Tolerances" shall be applied to "Contractor's Final Gradation" to establish the job control grading band.

The portion of the material passing the No. 40 (425 µm) sieve shall have a liquid limit of not more than 25 and a plasticity index of not more than six (6) when tested in accordance with ASTM D4318.

154-2.2 Sampling and testing.

a. Aggregate base materials. Samples shall be taken by the Contractor per ASTM D75 for initial aggregate subbase requirements and gradation. Material shall meet the requirements in paragraphs 154-2.1. The Contractor shall submit to the Resident Project Representative (RPR) certified test results showing that the aggregate meets the Material requirements of this section. Tests shall be representative of the material to be used for the project.

b. Gradation requirements. The Contractor shall take at least **[** one **]** aggregate subbase sample per day in the presence of the RPR to check the final gradation. Samples shall be taken from the in-place, un-compacted material at sampling locations determined by the RPR on a random basis per ASTM D3665. Sampling shall be per ASTM D75 and tested per ASTM C136 and ASTM C117. Results shall be furnished to the RPR by the Contractor each day during construction. Material shall meet the requirements in paragraph 154-2.1.

154-2.3 Separation Geotextile. Not used

154-2.4 Geogrid. Not used.

CONSTRUCTION METHODS

154-3.1 General. The subbase course shall be placed where designated on the plans or as directed by the RPR. The material shall be shaped and thoroughly compacted within the tolerances specified.

Granular subbases which, due to grain sizes or shapes, are not sufficiently stable to support the construction equipment without movement, shall be mechanically modified to the depth necessary to provide stability as directed by the RPR. The mechanical modification shall include the addition of a fine-grained medium to bind the particles of the subbase material sufficiently to furnish a bearing strength, so the course will not deform under construction equipment traffic.

154-3.2 Preparing underlying course. Prior to constructing the subbase course, clean the underlying course or subgrade of all foreign substances. The surface of the underlying course or subgrade shall meet specified compaction and surface tolerances in accordance with Item P-152. Correct ruts, soft yielding spots in the underlying courses, and subgrade areas having inadequate compaction and/or deviations of the surface from the specified requirements, by loosening and removing soft or unsatisfactory material, adding approved material, reshaping to line and grade, and recompacting to specified density requirements. For cohesionless underlying courses or subgrades containing sands or gravels, as defined in ASTM D2487, the surface shall be stabilized prior to placement of the overlying course by mixing the overlying course material into the underlying course, and compacting by approved methods. The stabilized material shall be considered as part of the underlying course and shall meet all requirements for the underlying course. The finished underlying course shall not be disturbed by traffic or other operations and shall be maintained in a satisfactory condition until the overlying course is placed. The underlying course shall be checked and accepted by the RPR before placing and spreading operations are started.

To protect the subgrade and to ensure proper drainage, spreading of the subbase shall begin along the centerline of the pavement on a crowned section or on the high side of pavements with a one-way slope.

154-3.3 Control Strip. The first half-day of subbase construction shall be considered as a control strip for the Contractor to demonstrate, in the presence of the RPR, that the materials, equipment, and construction processes meet the requirements of this specification. The sequence and manner of rolling necessary to obtain specified density requirements shall be determined. The maximum compacted thickness may be increased to a maximum of 12 inches (300 mm) upon the Contractor's demonstration that approved equipment and operations will uniformly compact the lift to the specified density. The RPR must witness this demonstration and approve the lift thickness prior to full production.

Control strips that do not meet specification requirements shall be reworked, re-compacted, or removed and replaced at the Contractor's expense. Full operations shall not begin until the control strip has been accepted by the RPR. The Contractor shall use the same equipment, materials, and construction methods for the remainder of construction, unless adjustments made by the Contractor are approved in advance by the RPR.

154-3.4 Placement. The material shall be placed and spread on the prepared underlying layer by spreader boxes or other devices as approved by the RPR, to a uniform thickness and width. The equipment shall have positive thickness controls to minimize the need for additional manipulation of the material. Dumping from vehicles that require re-handling shall not be permitted. Hauling over the uncompacted base course shall not be permitted. The material shall not be placed when the underlying course is soft or yielding.

The material shall meet gradation and moisture requirements prior to compaction. Material may be free-draining and the minimum moisture content shall be established for placement and compaction of the material.

The material shall be constructed in lifts as established in the control strip, but not less than 4 inches (100 mm) nor more than 12 inches (300 mm) of compacted thickness.

When more than one lift is required to establish the layer thickness shown on the plans, the construction procedure described here shall apply to each lift. No lift shall be covered by subsequent lifts until tests verify that compaction requirements have been met. The Contractor shall rework, re-compact and retest any material placed which does not meet the specifications.

154-3.5 Compaction. The subbase material shall be compacted, adjusting moisture as necessary, to be within ±2% of optimum moisture. The field density of the compacted material shall be at least 100% of the maximum density as specified in paragraph 154-3.9a. If the specified density is not attained, the area of the lift represented by the test shall be reworked and/or re-compacted and additional random tests made. This procedure shall be followed until the specified density is reached. Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

WARNING! A ductile iron raw watermain is located on the south side of the project – see plans for locations. Vibratory rolling will not be permitted within 10' of this pipe.

154-3.6 Weather limitation. Material shall not be placed unless the ambient air temperature is at least 40°F (4°C) and rising. Work on subbase course shall not be conducted when the subgrade is wet or frozen or the subbase material contains frozen material.

154-3.7 Maintenance. No base or surface course shall be placed on the subbase until the subbase has been accepted by the RPR. The Contractor shall maintain the completed course in satisfactory condition throughout placement of subsequent layers. When material has been exposed to excessive rain, snow, or freeze-thaw conditions, the Contractor shall verify that materials still meet all specification requirements before placement of additional material. Equipment may be routed over completed sections of subbase course, provided the equipment

does not damage the subbase course and the equipment is routed over the full width of the completed subbase course. Any damage to the subbase course from routing equipment over the subbase course shall be repaired by the Contractor at their expense.

154-3.8 Surface tolerance. In those areas on which a subbase or base course is to be placed, the surface shall be tested for smoothness and accuracy of grade and crown. Any portion lacking the required smoothness or failing in accuracy of grade or crown shall be scarified to a depth of at least 3 inches (75 mm), reshaped and re-compacted to grade until the required smoothness and accuracy are obtained and approved by the RPR. The Contractor shall perform all final smoothness and grade checks in the presence of the RPR. Any deviation in surface tolerances shall be corrected by the Contractor at the Contractor's expense.

a. Smoothness. The finished surface shall not vary more than +/- ½ inch (12 mm) when tested with a 12-foot (3.7-m) straightedge applied parallel with and at right angles to the centerline. The straightedge shall be moved continuously forward at half the length of the 12-foot (3.7-m) straightedge for the full length of each line on a 50-foot (15-m) grid.

b. Grade. The grade and crown shall be measured on a 50-foot (15-m) grid and shall be within +/-0.05 feet (15 mm) of the specified grade.

154-3.9 Acceptance sampling and testing. The aggregate base course shall be accepted for density and thickness on an area basis. Two tests shall be made for density and thickness for each 1,200 square yards ~~(1000 square meters)~~. Sampling locations will be determined on a random basis per ASTM D3665.

a. Density. The RPR shall perform all density tests

Each area shall be accepted for density when the field density is at least 100% of the maximum density of laboratory specimens compacted and tested per ASTM D1557. The in-place field density shall be determined per ASTM D1556. If the specified density is not attained, the area represented by the failed test shall be reworked and/or recompacted and two additional random tests made. This procedure shall be followed until the specified density is reached. Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

When the material has greater than 30 percent retained on the ¾ inch (19.0 mm) sieve, use methods in ASTM D1557 and the procedures in AASHTO T180 Annex for correction of maximum dry density and optimum moisture for oversized particles.

b. Thickness. The thickness of the base course shall be within +0 and -1/2 inch (12 mm) of the specified thickness as determined by depth tests taken by the Contractor in the presence of the RPR for each area. Where the thickness is deficient by more than 1/2-inch (12 mm), the Contractor shall correct such areas at no additional cost by scarifying to a depth of at least 3 inches (75 mm), adding new material of proper gradation, and the material shall be blended and recompacted to grade. The Contractor shall replace, at his expense, base material where depth tests have been taken.

METHOD OF MEASUREMENT

154-4.1 Subbase course shall be measured by the number of square yards of subbase course material placed and compacted to specified density and plan thickness requirements in the completed course. The quantity of subbase course material shall be measured in final position based upon survey of the completed work computed from elevations to the nearest 0.01 foot. On individual depth measurements, thicknesses more than 1/2 inch (12 mm) in excess of that shown

on the plans shall be considered as the specified thickness plus 1/2 inch (12 mm) in computing the yardage for payment. Subbase materials shall not be included in any other excavation quantities.

BASIS OF PAYMENT

154-5.1 Payment shall be made at the contract unit price per square yard for subbase course. This price shall be full compensation for furnishing all materials; for all preparation, hauling, and placing of these materials; and for all labor, equipment, tools, ***surveying,*** and incidentals necessary to complete the item.

Payment will be made under:

Item P-154-5.1	Subbase Course, 12” Thick - per square yard
Item P-154-5.2	Subbase Course, 6” Thick - per square yard

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM C117	Standard Test Method for Materials Finer than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C136	Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM D75	Standard Practice for Sampling Aggregates
ASTM D698	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3))
ASTM D1556	Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D1557	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3))
ASTM D2487	Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D4253	Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table
ASTM D4759	Practice for Determining the Specification Conformance of Geosynthetics
ASTM D4318	Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D6938	Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

American Association of State Highway and Transportation Officials (AASHTO)

M 288 Geotextile Specification for Highway Applications

END OF ITEM P-154

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ITEM P-211 LIME ROCK BASE COURSE

DESCRIPTION

211-1.1 This item shall consist of a base course composed of lime rock constructed on the prepared underlying course per these specifications and shall conform to the dimensions and typical cross-section shown on the plans.

MATERIALS

211-2.1 Materials. The lime rock base course material shall consist of fossiliferous limestone of uniform quality. The material shall not contain hard or flinty pieces that will cause a rough surface containing pits and pockets. The rock shall show no tendency to "air slake" or undergo chemical change when exposed to the weather. ***Lime rock material shall not contain chert or other extremely hard pieces, or lumps, balls or pockets of sand or clay material in sufficient quantity as to be detrimental to the proper bonding, finishing or strength of the lime rock base course.*** The material when watered and rolled shall be capable of compacting to a dense and well-bonded base.

Lime Rock Base Course Material Properties[2]

	Lime Rock	Oolitic	Non-Oolitic
Carbonates of calcium and magnesium[1]	95% minimum	70% minimum	75% minimum
Oxides of iron and aluminum[1]	Less than or equal to 2%	Less than or equal to 2%	Less than or equal to 2%
Liquid limit	Not greater than 35	NA	Not greater than 35
Plasticity Index	Not greater than 6	NA	Not greater than 6
Organic or foreign matter	Not more than 0.5%	Not more than 0.5%	Not more than 0.5%
Lime Bearing Ratio (LBR)[3] at 0 to +1.5% optimum	125	125	125

[1] The combined amount of carbonates, oxides, and silica shall be at least 97%. The material shall be non-plastic.

[2] The chemical analysis of lime rock shall consist of determining the insoluble silica, iron oxide, and alumina by solution of the sample in hydrochloric (HCl) acid, evaporating, dehydrating, re-dissolving the residue, and neutralizing with ammonium hydroxide, filtering, washing, and igniting the residue lime rock. The difference between the percentage of insoluble matter and 100% is reported as carbonates of calcium and magnesium.

[3] FM 5-515, Florida Method of Test for Lime Rock Bearing Ratio

Lime Rock Base Course Gradation

Sieve Designation (square openings)	Percentage by Weight Passing Sieves
3-1/2 inch (87.5 mm)	100
3/4 inch (19.0 mm)	50-100

All fine material shall consist entirely of dust of fracture (fine portion passing the No. 10 (2.00 mm) sieve). ***The maximum individual dimension shall not exceed 6 inches. All crushing or break-up, which is necessary in order to meet these gradation requirements, shall be done before the lime rock is placed in the base course.***

211-2.2 Sampling and Testing.

a. Aggregate base materials. The Contractor shall take samples of the aggregate base in accordance with ASTM D75 to verify initial aggregate base requirements and gradation. Material shall meet the requirements in paragraph 211-2.1. This sampling and testing will be the basis for approval of the aggregate base quality requirements.

b. Gradation requirements. The Contractor shall take at least two aggregate base samples per day in the presence of the Resident Project Representative (RPR) to check the final gradation ***providing a consistent material source is used for that day***. Sampling shall be per ASTM D75. Material shall meet the requirements in paragraph 209-2.1. The lot will be consistent with the lot size used for density. The samples shall be taken from the in-place, un-compacted material at sampling points and intervals designated by the RPR.

c. Sampling shall be taken by the Contractor Quality Control (QC) technician in the presence of the RPR's Quality Assurance (QA) representative. Each sample shall be mixed and quartered by the QC Technician such that the QC technician and the QA representative will each possess adequate size sample for testing.

211-2.3 Separation Geotextile. Not used.

CONSTRUCTION METHODS

211-3.1 Control strip. The first half-day of construction shall be considered the control strip. The Contractor shall demonstrate, in the presence of the RPR, that the materials, equipment, and construction processes meet the requirements of the specification. The sequence and manner of rolling necessary to obtain specified density requirements shall be determined. Control strips that do not meet specification requirements shall be removed and replaced at the Contractor's expense. Full operations shall not continue until the control strip has been accepted by the RPR. Upon acceptance of the control strip by the RPR, the Contractor shall use the same equipment, materials, and construction methods for the remainder of construction, unless adjustments made by the Contractor are approved in advance by the RPR.

211-3.2 Preparing underlying course. ***Before any rock base course material is placed, the underlying course shall be prepared and conditioned as specified.*** The RPR shall check and accept the underlying course before placing and spreading operations are started. Any ruts or soft yielding places caused by improper drainage conditions, hauling, or any other cause shall be corrected at the Contractor's expense before the base course is placed. Material shall not be placed on frozen subgrade.

To protect the underlying course and to insure proper drainage the spreading of the limerock shall begin along the centerline of the pavement on a crowned section or on the high side of pavement with a one-way slope.

211-3.3 Placement. The material shall be placed and spread on the prepared underlying layer by spreader boxes or other devices as approved by the RPR, to a uniform thickness and width. The equipment shall have positive thickness controls to minimize the need for additional manipulation of the material. Dumping from vehicles that require re-handling shall not be permitted. Hauling over the uncompacted base course shall not be permitted.

The material shall meet gradation and moisture requirements prior to compaction. The layer shall be constructed in lifts as established in the control strip, but not less than 4 inches (~~100 mm~~) nor more than 12 inches (~~300 mm~~) of compacted thickness.

When more than one lift is required to establish the layer thickness shown on the plans, the construction procedure described here shall apply to each lift. No lift shall be covered by subsequent lifts until tests verify that compaction requirements have been met. The Contractor shall rework, re-compact and retest any material placed which does not meet the specifications.

211-3.4 Compaction. Immediately upon completion of the spreading operations, compact each layer of the base course, as specified, with approved compaction equipment. The number, type, and weight of rollers shall be sufficient to compact the material to the required density within the same day that the aggregate is placed on the subgrade. The field density of each compacted lift of material shall be at least 100% of the maximum density of laboratory specimens prepared from samples of the subbase material delivered to the jobsite. The moisture content of the material during placing operations shall be within ±2 percentage points of the optimum moisture content as determined by ASTM **1557**. Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

Sufficient rollers of the designated types shall be furnished to adequately handle the compaction of the material that has been placed and spread. Blading and rolling shall be done alternately as required or directed to obtain a smooth, even surface and until the entire depth of base is compacted into a dense, unyielding mass. Re-rolling of previous day's spread shall be done as directed. When the shoulder backfill material has been placed, the shoulder shall be thoroughly rolled and compacted

Along curbs, headers, and all areas inaccessible to the roller, the base course material shall be tamped thoroughly with mechanical or hand tampers.

WARNING! A ductile iron raw watermain is located on the south side of the project – see plans for locations. Vibratory rolling will not be permitted within 10' of this pipe.

211-3.5 Finishing. After the watering and rolling of the base course, the entire surface shall be scarified to a depth of at least 3 inches (~~75 mm~~) and shaped to the exact crown and cross-section with a blade grader. The scarified material shall be rewetted and thoroughly rolled. Rolling shall continue until the base is bonded and compacted to a dense, unyielding mass, true to grade and cross-section. Scarifying and rolling of the surface of the base shall follow the initial rolling of the lime rock by not more than four (4) days. When the lime rock base is constructed in two layers, the scarifying of the surface shall be to a depth of 2 inches (~~50 mm~~).

If cracks or checks appear in the base before the surface course is laid, the Contractor shall rescarify, reshape, water, add lime rock where necessary, and recompact. If the underlying

material becomes mixed with the base course material, the Contractor shall, without additional compensation, remove, reshape, and recompact the mixture.

211-3.6 Weather limitations. Material shall not be placed unless the ambient air temperature is at least 40°F (4°C) and rising. Work on base course shall not be conducted when the subgrade or subbase is wet or frozen or the base material contains frozen material.

211-3.7 Maintenance. The base course shall be maintained in a condition that will meet all specification requirements until the work is accepted by the RPR. When material has been exposed to excessive rain, snow, or freeze-thaw conditions, prior to placement of additional material, the Contractor shall verify that materials still meet all specification requirements. Equipment may be routed over completed sections of base course, provided that no damage results and the equipment is routed over the full width of the completed base course. Any damage resulting to the base course from routing equipment over the base course shall be repaired by the Contractor at the Contractor's expense.

211-3.8 Surface tolerance. After the course has been compacted, the surface shall be tested for smoothness and accuracy of grade and crown. Any portion lacking the required smoothness or failing in accuracy of grade or crown shall be scarified to a depth of at least 3 inches (~~75 mm~~), reshaped and recompacted to grade until the required smoothness and accuracy are obtained and approved by the RPR. Any deviation in surface tolerances shall be corrected by the Contractor at the Contractor's expense. The smoothness and accuracy requirements specified here apply only to the top layer when base course is constructed in more than one layer.

a. Smoothness. The finished surface shall not vary more than 3/8-inch (~~9 mm~~) when tested with a 12-foot (~~3.7 m~~) straightedge applied parallel with and at right angles to the centerline. The straightedge shall be moved continuously at half the length of the 12-foot (~~3.7 m~~) straightedge for the full length of each line on a 50-foot (~~15 m~~) grid. **Straightedge shall be provided by the Contractor.**

b. Grade. The grade and crown shall be measured on a 50-foot (~~15 m~~) grid and shall be within +0 and -1/2 inch (12 mm) of the specified grade.

211-3.9 Acceptance sampling and testing. Lime rock base course shall be accepted for density on an area basis. Two tests shall be made for density and thickness for each 2400 square yds (~~1000 m^2~~). Sampling locations will be determined on a random basis per ASTM D3665.

a. Density. The Contractor's laboratory shall perform all density tests in the RPR's presence and provide the test results upon completion to the RPR for acceptance**.**

Each area shall be accepted for density when the field density is at least 100% of the maximum density of laboratory specimens compacted and tested per ASTM D1557. The in-place field density shall be determined per ASTM D1556 or ASTM D6938 using Procedure A, the direct transmission method, and ASTM D6938 shall be used to determine the moisture content of the material. The machine shall be calibrated in accordance with ASTM D6938. If the specified density is not attained, the entire area shall be reworked and/or recompacted and two additional random tests made. This procedure shall be followed until the specified density is reached. Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

b. Thickness. Depth tests shall be made by ***survey*** ~~test holes or cores at least 3 inches (75 mm) in diameter that extend through the base~~ ***at intervals so each test shall represent 300***

~~***square yards in the presence of the RPR***~~. The thickness of the base course shall be within +0 and -1/2 inch ~~(12 mm)~~ of the specified thickness ~~as determined by depth tests taken by the Contractor in the presence of the RPR for each area~~. Where the thickness is deficient by more than 1/2-inch (~~12 mm~~), the Contractor shall correct such areas at no additional cost by scarifying to a depth of at least 3 inches ~~(75 mm~~), adding new material of proper gradation, and the material shall be blended and recompacted to grade. The Contractor shall replace, at his expense, base material where depth tests have been taken.

METHOD OF MEASUREMENT

211-4.1 The quantity of lime rock base course shall be the number of square yards ~~(square meters)~~ of base material placed, bonded, and accepted in the completed base course ***at the specified thickness***. The quantity of base course material shall be measured in final position based upon depth tests ***taken by the Contractor's Surveyor*** as directed by the RPR. On individual depth measurements, thicknesses more than 1/2 inch (~~12 mm~~) in excess of that shown on the plans shall be considered as the specified thickness plus 1/2 inch (~~12 mm~~) in computing the yardage for payment.

BASIS OF PAYMENT

211-5.1 Payment shall be made at the contract unit price per square yards ~~(square meters)~~ for lime rock base course. This price shall be full compensation for furnishing all materials and for all preparation, hauling, and placing of these materials, and for all labor, equipment, tools, ***survey,*** and incidentals necessary to complete the item.

The cost of removing cracks and checks including the labor, and the additional lime rock necessary for crack elimination, will not be paid for separately but shall be included in the contract price per square yard (~~square meter~~) for lime rock base course.

Payment will be made under:

Item P-211-5.1 Lime Rock Base Course (6" Thickness) – per Square Yard

Item P-211-5.2 Lime Rock Base Course (9" Thickness) – per Square Yard

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM C136	Standard Test Method for Sieve or Screen Analysis of Fine and Coarse Aggregates
ASTM D75	Standard Practice for Sampling Aggregates
ASTM D698	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3))
ASTM D1556	Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method

ASTM D1557	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2700 kN-m/m^3))
ASTM D3665	Standard Practice for Random Sampling of Construction Materials
ASTM D4318	Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D4491	Standard Test Methods for Water Permeability of Geotextiles by Permittivity
ASTM D4751	Standard Test Methods for Determining Apparent Opening Size of a Geotextile
American Association of State Highway and Transportation Officials (AASHTO)	
M288	Standard Specification for Geosynthetic Specification for Highway Applications

END OF ITEM P-211

ITEM P-401 ASPHALT MIX PAVEMENT

DESCRIPTION

401-1.1 This item shall consist of pavement courses composed of mineral aggregate and asphalt binder mixed in a central mixing plant and placed on a prepared base or stabilized course in accordance with these specifications and shall conform to the lines, grades, thicknesses, and typical cross-sections shown on the plans. Each course shall be constructed to the depth, typical section, and elevation required by the plans and shall be rolled, finished, and approved before the placement of the next course.

MATERIALS

401-2.1 Aggregate. Aggregates shall consist of crushed stone, crushed gravel, ~~crushed slag~~, screenings, natural sand, and mineral filler, as required. The aggregates should have no known history of detrimental pavement staining due to ferrous sulfides, such as pyrite. ***The Contractor shall provide certification that aggregates are free of ferrous sulfides***. Coarse aggregate is the material retained on the No. 4 (~~4.75 mm~~) sieve. Fine aggregate is the material passing the No. 4 (~~4.75 mm~~) sieve.

a. Coarse aggregate. Coarse aggregate shall consist of sound, tough, durable particles, free from films of matter that would prevent thorough coating and bonding with the asphalt material and free from organic matter and other deleterious substances. Coarse aggregate material requirements are given in the table below.

Coarse Aggregate Material Requirements

Material Test	Requirement	Standard
Resistance to Degradation	Loss: 40% maximum	ASTM C131
Soundness of Aggregates by Use of Sodium Sulfate **or** Magnesium Sulfate	Loss after 5 cycles: 12% maximum using Sodium sulfate - or - 18% maximum using magnesium sulfate	ASTM C88
Clay lumps and friable particles	0.3% maximum	ASTM C142
Percentage of Fractured Particles	For pavements designed for aircraft gross weights of 60,000 pounds (27200 kg) or more: Minimum 75% by weight of particles with at least two fractured faces and 85% with at least one fractured face[1]	ASTM D5821
	~~For pavements designed for aircraft gross weights less than 60,000 pounds (27200 kg):~~ ~~Minimum 50% by weight of particles with at least two fractured faces and 65% with at least one fractured face[1]~~	
Flat, Elongated, or Flat and Elongated Particles	8% maximum, by weight, of flat, elongated, or flat and elongated particles at 5:1 [2]	ASTM D4791
~~Bulk density of slag [3]~~	~~Weigh not less than 70 pounds per cubic foot (1.12 Mg/cubic meter)~~	~~ASTM C29.~~

[1] The area of each face shall be equal to at least 75% of the smallest mid-sectional area of the piece. When two fractured faces are contiguous, the angle between the planes of fractures shall be at least 30 degrees to count as two fractured faces.

[2] A flat particle is one having a ratio of width to thickness greater than five (5); an elongated particle is one having a ratio of length to width greater than five (5).

~~[3] Only required if slag is specified.~~

b. Fine aggregate. Fine aggregate shall consist of clean, sound, tough, durable, angular shaped particles produced by crushing stone, ~~slag~~, or gravel and shall be free from coatings of clay, silt, or other objectionable matter. Natural (non-manufactured) sand may be used to obtain the gradation of the fine aggregate blend or to improve the workability of the mix. Fine aggregate material requirements are listed in the table below.

Fine Aggregate Material Requirements

Material Test	Requirement	Standard
Liquid limit	25 maximum	ASTM D4318
Plasticity Index	4 maximum	ASTM D4318
Soundness of Aggregates by Use of Sodium Sulfate **or** Magnesium Sulfate	Loss after 5 cycles: 10% maximum using Sodium sulfate - or - 15% maximum using magnesium sulfate	ASTM C88
Clay lumps and friable particles	0.3% maximum	ASTM C142
Sand equivalent	45 minimum	ASTM D2419
Natural Sand	15% maximum by weight of total aggregate	ASTM D1073

c. Sampling. ASTM D75 shall be used in sampling coarse and fine aggregate.

401-2.2 Mineral filler. Mineral filler (baghouse fines) may be added in addition to material naturally present in the aggregate. Mineral filler shall meet the requirements of ASTM D242.

Mineral Filler Requirements

Material Test	Requirement	Standard
Plasticity Index	4 maximum	ASTM D4318

401-2.3 Asphalt binder. Asphalt binder shall conform to ASTM D6373 Performance Grade (PG) **76-22**.

Asphalt Binder PG Plus Test Requirements

Material Test	Requirement	Standard
Elastic Recovery	75% minimum	ASTM D6084

401-2.4 Anti-stripping agent. Any anti-stripping agent or additive (anti-strip) shall be heat stable and shall not change the asphalt binder grade beyond specifications. Anti-strip shall be an approved material of the Department of Transportation of the State in which the project is located.

COMPOSITION

401-3.1 Composition of mixture(s). The asphalt mix shall be composed of a mixture of aggregates, filler and anti-strip agent if required, and asphalt binder. The aggregate fractions shall be sized, handled in separate size groups, and combined in such proportions that the resulting mixture meets the grading requirements of the job mix formula (JMF).

401-3.2 Job mix formula (JMF) laboratory. The laboratory used to develop the JMF shall possess a current certificate of accreditation, listing D3666 from a national accrediting authority and all test methods required for developing the JMF; and be listed on the accrediting authority's website. A copy of the laboratory's current accreditation and accredited test methods shall be submitted to the Resident Project Representative (RPR) prior to start of construction.

401-3.3 Job mix formula (JMF). No asphalt mixture shall be placed until an acceptable mix design has been submitted to the RPR for review and accepted in writing. The RPR's review shall not relieve the Contractor of the responsibility to select and proportion the materials to comply with this section.

When the project requires asphalt mixtures of differing aggregate gradations and/or binders, a separate JMF shall be submitted for each mix. Add anti-stripping agent to meet tensile strength requirements.

The JMF shall be prepared by an accredited laboratory that meets the requirements of paragraph 401-3.2. The asphalt mixture shall be designed using procedures contained in Asphalt Institute MS-2 Mix Design Manual, 7th Edition**.** Samples shall be prepared and compacted using the gyratory compactor in accordance with ASTM D6925.

Should a change in sources of materials be made, a new JMF must be submitted to the RPR for review and accepted in writing before the new material is used. After the initial production JMF has been approved by the RPR and a new or modified JMF is required for whatever reason, the subsequent cost of the new or modified JMF, including a new control strip when required by the RPR, will be borne by the Contractor.

The RPR may request samples at any time for testing, prior to and during production, to verify the quality of the materials and to ensure conformance with the applicable specifications.

The JMF shall be submitted in writing by the Contractor at least ***30*** days prior to the start of paving operations. The JMF shall be developed within the same construction season using aggregates proposed for project use.

The JMF shall be dated, and stamped or sealed by the responsible professional Engineer of the laboratory and shall include the following items as a minimum:

a. Manufacturer's Certificate of Analysis (COA) for the asphalt binder used in the JMF in accordance with paragraph 401-2.3. Certificate of asphalt performance grade is with modifier already added, if used and must indicate compliance with ASTM D6373. For plant modified asphalt binder, certified test report indicating grade certification of modified asphalt binder.

b. Manufacturer's Certificate of Analysis (COA) for the anti-stripping agent if used in the JMF in accordance with paragraph 401-2.4.

c. Certified material test reports for the course and fine aggregate and mineral filler in accordance with paragraphs 401-2.1.

d. Percent passing each sieve size for individual gradation of each aggregate cold feed and/or hot bin; percent by weight of each cold feed and/or hot bin used; and the total combined gradation in the JMF.

e. Specific Gravity and absorption of each coarse and fine aggregate.

f. Percent natural sand.

g. Percent fractured faces.

h. Percent by weight of flat particles, elongated particles, and flat and elongated particles (and criteria).

i. Percent of asphalt.

j. Number of ~~blows or~~ gyrations

k. Laboratory mixing and compaction temperatures.

l. Supplier-recommended field mixing and compaction temperatures.

m. Plot of the combined gradation on a 0.45 power gradation curve.

n. Graphical plots of air voids, voids in the mineral aggregate (VMA), and unit weight versus asphalt content. To achieve minimum VMA during production, the mix design needs to account for material breakdown during production.

o. Tensile Strength Ratio (TSR).

p. Type and amount of Anti-strip agent when used.

q. Asphalt Pavement Analyzer (APA) results.

r. Date the JMF was developed. Mix designs that are not dated or which are from a prior construction season shall not be accepted. ***All material testing, for shop drawing submittals, will be performed by an engineer registered in the state of Florida. Material testing must be performed within 6 months of shop drawing submittal. Shop drawings with tests performed beyond 6 months will be rejected.***

Table 1. Asphalt Design Criteria

Test Property	Value	Test Method
Number of ~~blows or~~ gyrations	75	
Air voids (%)	***2.8 – 4.2***	ASTM D3203
Percent voids in mineral aggregate (VMA), minimum	See Table 2	ASTM D6995
Tensile Strength Ratio (TSR)[1]	not less than 80 at a saturation of 70-80%	ASTM D4867
Asphalt Pavement Analyzer (APA)[2]	Less than 10 mm @ 4000 passes	AASHTO T340 at 250 psi hose pressure at 64°C test temperature

[1] Test specimens for TSR shall be compacted at 7 ± 1.0 % air voids. In areas subject to freeze-thaw, use freeze-thaw conditioning in lieu of moisture conditioning per ASTM D4867.

[2] AASHTO T340 at 100 psi hose pressure at 64°C test temperature may be used in the interim. If this method is used the required Value shall be less than 5 mm @ 8000 passes

The mineral aggregate shall be of such size that the percentage composition by weight, as determined by laboratory sieves, will conform to the gradation or gradations specified in Table 2 when tested in accordance with ASTM C136 and ASTM C117.

The gradations in Table 2 represent the limits that shall determine the suitability of aggregate for use from the sources of supply; be well graded from coarse to fine and shall not vary from the low limit on one sieve to the high limit on the adjacent sieve, or vice versa.

Table 2. Aggregate - Asphalt Pavements

Sieve Size	Percentage by Weight Passing Sieves		
	~~**Gradation 1**~~	**Gradation 2**	~~**Gradation 3**~~
1 inch (25.0 mm)	~~100~~	--	~~--~~
3/4 inch (19.0 mm)	~~90-100~~	100	~~--~~
1/2 inch (12.5 mm)	~~68-88~~	90-100	~~100~~
3/8 inch (9.5 mm)	~~60-82~~	72-88	~~90-100~~
No. 4 (4.75 mm)	~~45-67~~	53-73	~~58-78~~
No. 8 (2.36 mm)	~~32-54~~	38-60	~~40-60~~
No. 16 (1.18 mm)	~~22-44~~	26-48	~~28-48~~
No. 30 (600 µm)	~~15-35~~	18-38	~~18-38~~
No. 50 (300 µm)	~~9-25~~	11-27	~~11-27~~
No. 100 (150 µm)	~~6-18~~	6-18	~~6-18~~
No. 200 (75 µm)	~~3-6~~	3-6	~~3-6~~
Minimum Voids in Mineral Aggregate (VMA)[1]	~~14.0~~	15.0	~~16.0~~
Asphalt percent by total weight of mixture:			
Stone or gravel	~~4.5-7.0~~	5.0-7.5	~~5.5-8.0~~
~~Slag~~	~~5.0-7.5~~	~~6.5-9.5~~	~~7.0-10.5~~
Recommended Minimum Construction Lift Thickness	~~3 inch~~	2 inch	~~1 1/2 inch~~

Gradation 2 for runways, taxiways and apron.

~~Gradation 3 is intended for leveling courses. FAA approval is required for use in other locations.~~

[1]To achieve minimum VMA during production, the mix design needs to account for material breakdown during production.

The aggregate gradations shown are based on aggregates of uniform specific gravity. The percentages passing the various sieves shall be corrected when aggregates of varying specific gravities are used, as indicated in the Asphalt Institute MS-2 Mix Design Manual, 7th Edition.

401-3.4 Reclaimed asphalt pavement (RAP). RAP shall not be used.

401-3.5 Control Strip. Full production shall not begin until an acceptable control strip has been constructed and accepted in writing by the RPR**.** The Contractor shall prepare and place a quantity of asphalt according to the JMF. The underlying grade or pavement structure upon

which the control strip is to be constructed shall be the same as the remainder of the course represented by the control strip.

The Contractor will not be allowed to place the control strip until the Contractor quality control program (CQCP), showing conformance with the requirements of paragraph 401-5.1, has been accepted, in writing, by the RPR.

The control strip will consist of at least 250 tons (~~227 metric tons~~) or 1/2 sublot, whichever is greater. The control strip shall be placed in two lanes of the same width and depth to be used in production with a longitudinal cold joint. The cold joint must be cut back in accordance with paragraph 401-4.14 using the same procedure that will be used during production. The cold joint for the control strip will be an exposed construction joint at least four (4) hours old or when the mat has cooled to less than 160°F (71°C). The equipment used in construction of the control strip shall be the same type, configuration and weight to be used on the project.

The control strip will be considered acceptable by the RPR if the gradation, asphalt content, and VMA are within the action limits specified in paragraph 401-5.5a; and Mat density, air voids, and joint density meet the requirements specified in paragraphs 401-6.2.

If the control strip is unacceptable, necessary adjustments to the JMF, plant operation, placing procedures, and/or rolling procedures shall be made and another control strip shall be placed. Unacceptable control strips shall be removed at the Contractor's expense.

Payment will only be made for an acceptable control strip in accordance with paragraph 401-8.1 using a lot pay factor equal to 100.

CONSTRUCTION METHODS

401-4.1 Weather limitations. The asphalt shall not be placed upon a wet surface or when the surface temperature of the underlying course is less than specified in Table 4. The temperature requirements may be waived by the RPR, if requested; however, all other requirements including compaction shall be met.

Table 4. Surface Temperature Limitations of Underlying Course

Mat Thickness	Base Temperature (Minimum)	
	°F	°C
3 inches (7.5 cm) or greater	40 [1]	4
Greater than 2 inches (50 mm) but less than 3 inches (7.5 cm)	45	7

401-4.2 Asphalt plant. Plants used for the preparation of asphalt shall conform to the requirements of American Association of State Highway and Transportation Officials (AASHTO) M156 including the following items.

a. Inspection of plant. The RPR, or RPR's authorized representative, shall have access, at all times, to all areas of the plant for checking adequacy of equipment; inspecting operation of the plant: verifying weights, proportions, and material properties; and checking the temperatures maintained in the preparation of the mixtures.

b. Storage bins and surge bins. The asphalt mixture stored in storage and/or surge bins shall meet the same requirements as asphalt mixture loaded directly into trucks. Asphalt mixture shall not be stored in storage and/or surge bins for a period greater than twelve (12) hours. If the RPR determines there is an excessive heat loss, segregation, or oxidation of the asphalt mixture due to temporary storage, temporary storage shall not be allowed.

401-4.3 Aggregate stockpile management. Aggregate stockpiles shall be constructed in a manner that prevents segregation and intermixing of deleterious materials. Aggregates from different sources shall be stockpiled, weighed and batched separately at the asphalt batch plant. Aggregates that have become segregated or mixed with earth or foreign material shall not be used.

A continuous supply of materials shall be provided to the work to ensure continuous placement.

401-4.4 Hauling equipment. Trucks used for hauling asphalt shall have tight, clean, and smooth metal beds. To prevent the asphalt from sticking to the truck beds, the truck beds shall be lightly coated with a minimum amount of paraffin oil, lime solution, or other material approved by the RPR. Petroleum products shall not be used for coating truck beds. Each truck shall have a suitable cover to protect the mixture from adverse weather. When necessary, to ensure that the mixture will be delivered to the site at the specified temperature, truck beds shall be insulated or heated and covers shall be securely fastened.

401-4.4.1 Material transfer vehicle (MTV). Material transfer vehicles used to transfer the material from the hauling equipment to the paver, shall use a self-propelled, material transfer vehicle with a swing conveyor that can deliver material to the paver without making contact with the paver. The MTV shall be able to move back and forth between the hauling equipment and the paver providing material transfer to the paver, while allowing the paver to operate at a constant speed. The Material Transfer Vehicle will have remixing and storage capability to prevent physical and thermal segregation. ***Use of a MTV is optional and at the discretion of the Contractor. Any damage to airport infrastructure from MTV use will be repaired by the Contractor and at the Contractor's expense.***

401-4.5 Asphalt pavers. Asphalt pavers shall be self-propelled with an activated heated screed, capable of spreading and finishing courses of asphalt that will meet the specified thickness, smoothness, and grade. The paver shall have sufficient power to propel itself and the hauling equipment without adversely affecting the finished surface. The asphalt paver shall be equipped with a control system capable of automatically maintaining the specified screed grade and elevation.

If the spreading and finishing equipment in use leaves tracks or indented areas, or produces other blemishes in the pavement that are not satisfactorily corrected by the scheduled operations, the use of such equipment shall be discontinued.

The paver shall be capable of paving to a minimum width specified in paragraph 401-4.12.

401-4.6 Rollers. The number, type, and weight of rollers shall be sufficient to compact the asphalt to the required density while it is still in a workable condition without crushing of the aggregate, depressions or other damage to the pavement surface. Rollers shall be in good condition, clean, and capable of operating at slow speeds to avoid displacement of the asphalt. All rollers shall be specifically designed and suitable for compacting asphalt concrete and shall

be properly used. Rollers that impair the stability of any layer of a pavement structure or underlying soils shall not be used.

WARNING! A ductile iron raw watermain is located on the south side of the project – see plans for locations. Vibratory rolling will not be permitted within 10' of this pipe.

401-4.7 Density device. The Contractor shall have on site a density gauge during all paving operations in order to assist in the determination of the optimum rolling pattern, type of roller and frequencies, as well as to monitor the effect of the rolling operations during production paving. The Contractor shall supply a qualified technician during all paving operations to calibrate the gauge and obtain accurate density readings for all new asphalt. These densities shall be supplied to the RPR upon request at any time during construction. No separate payment will be made for supplying the density gauge and technician.

401-4.8 Preparation of asphalt binder. The asphalt binder shall be heated in a manner that will avoid local overheating and provide a continuous supply of the asphalt binder to the mixer at a uniform temperature. The temperature of unmodified asphalt binder delivered to the mixer shall be sufficient to provide a suitable viscosity for adequate coating of the aggregate particles, but shall not exceed 325°F (~~160°C~~) when added to the aggregate. The temperature of modified asphalt binder shall be no more than 350°F (~~175°C~~) when added to the aggregate.

401-4.9 Preparation of mineral aggregate. The aggregate for the asphalt shall be heated and dried. The maximum temperature and rate of heating shall be such that no damage occurs to the aggregates. The temperature of the aggregate and mineral filler shall not exceed 350°F (~~175°C~~) when the asphalt binder is added. Particular care shall be taken that aggregates high in calcium or magnesium content are not damaged by overheating. The temperature shall not be lower than is required to obtain complete coating and uniform distribution on the aggregate particles and to provide a mixture of satisfactory workability.

401-4.10 Preparation of Asphalt mixture. The aggregates and the asphalt binder shall be weighed or metered and mixed in the amount specified by the JMF. The combined materials shall be mixed until the aggregate obtains a uniform coating of asphalt binder and is thoroughly distributed throughout the mixture. Wet mixing time shall be the shortest time that will produce a satisfactory mixture, but not less than 25 seconds for batch plants. The wet mixing time for all plants shall be established by the Contractor, based on the procedure for determining the percentage of coated particles described in ASTM D2489, for each individual plant and for each type of aggregate used. The wet mixing time will be set to achieve 95% of coated particles. For continuous mix plants, the minimum mixing time shall be determined by dividing the weight of its contents at operating level by the weight of the mixture delivered per second by the mixer. The moisture content of all asphalt upon discharge shall not exceed 0.5%.

401-4.11 Application of Prime and Tack Coat. Immediately before placing the asphalt mixture, the underlying course shall be cleaned of all dust and debris.

A prime coat in accordance with Item P-602 shall be applied to aggregate base prior to placing the asphalt mixture.

A tack coat shall be applied in accordance with Item P-603 to all vertical and horizontal asphalt and concrete surfaces prior to placement of the first and each subsequent lift of asphalt mixture.

401-4.12 Laydown plan, transporting, placing, and finishing. Prior to the placement of the asphalt, the Contractor shall prepare a laydown plan with the sequence of paving lanes and width to minimize the number of cold joints; the location of any temporary ramps; laydown temperature; and estimated time of completion for each portion of the work (milling, paving, rolling, cooling, etc.). The laydown plan and any modifications shall be approved by the RPR.

Deliveries shall be scheduled so that placing and compacting of asphalt is uniform with minimum stopping and starting of the paver. Hauling over freshly placed material shall not be permitted until the material has been compacted, as specified, and allowed to cool to approximately ambient temperature. The Contractor, at their expense, shall be responsible for repair of any damage to the pavement caused by hauling operations.

Contractor shall survey each lift of asphalt surface course and certify to RPR that every lot of each lift meets the grade tolerances of paragraph 401-6.2d before the next lift can be placed.

Edges of existing asphalt pavement abutting the new work shall be saw cut and the cut off material and laitance removed. Apply a tack coat in accordance with P-603 before new asphalt material is placed against it.

The speed of the paver shall be regulated to eliminate pulling and tearing of the asphalt mat. Placement of the asphalt mix shall begin along the centerline of a crowned section or on the high side of areas with a one way slope unless shown otherwise on the laydown plan as accepted by the RPR. The asphalt mix shall be placed in consecutive adjacent lanes having a minimum width of **12.5** feet (~~m~~) except where edge lanes require less width to complete the area. Additional screed sections attached to widen the paver to meet the minimum lane width requirements must include additional auger sections to move the asphalt mixture uniformly along the screed extension.

The longitudinal joint in one course shall offset the longitudinal joint in the course immediately below by at least one foot (~~30 cm~~); however, the joint in the surface top course shall be at the centerline of crowned pavements. Transverse joints in one course shall be offset by at least 10 feet (3 m) from transverse joints in the previous course. Transverse joints in adjacent lanes shall be offset a minimum of 10 feet (3 m). On areas where irregularities or unavoidable obstacles make the use of mechanical spreading and finishing equipment impractical, the asphalt may be spread and luted by hand tools.

The RPR may at any time, reject any batch of asphalt, on the truck or placed in the mat, which is rendered unfit for use due to contamination, segregation, incomplete coating of aggregate, or overheated asphalt mixture. Such rejection may be based on only visual inspection or temperature measurements. In the event of such rejection, the Contractor may take a representative sample of the rejected material in the presence of the RPR, and if it can be demonstrated in the laboratory, in the presence of the RPR, that such material was erroneously rejected, payment will be made for the material at the contract unit price.

Areas of segregation in the surface course, as determined by the RPR, shall be removed and replaced at the Contractor's expense. The area shall be removed by saw cutting and milling a minimum of the construction lift thickness as specified in paragraph 401-3.3, Table 2 for the approved mix design. The area to be removed and replaced shall be a minimum width of the paver and a minimum of 10 feet (3 m) long.

401-4.13 Compaction of asphalt mixture. After placing, the asphalt mixture shall be thoroughly and uniformly compacted by self-propelled rollers. The surface shall be compacted as soon as possible when the asphalt has attained sufficient stability so that the rolling does not cause undue displacement, cracking or shoving. The sequence of rolling operations and the type of rollers used shall be at the discretion of the Contractor. The speed of the roller shall, at all times, be sufficiently slow to avoid displacement of the hot mixture and be effective in

compaction. Any surface defects and/or displacement occurring as a result of the roller, or from any other cause, shall be corrected at the Contractor's expense.

Sufficient rollers shall be furnished to handle the output of the plant. Rolling shall continue until the surface is of uniform texture, true to grade and cross-section, and the required field density is obtained. To prevent adhesion of the asphalt to the roller, the wheels shall be equipped with a scraper and kept moistened with water as necessary.

In areas not accessible to the roller, the mixture shall be thoroughly compacted with approved power tampers.

Any asphalt that becomes loose and broken, mixed with dirt, contains check-cracking, or in any way defective shall be removed and replaced with fresh hot mixture and immediately compacted to conform to the surrounding area. This work shall be done at the Contractor's expense. Skin patching shall not be allowed.

WARNING! A ductile iron raw watermain is located on the south side of the project – see plans for locations. Vibratory rolling will not be permitted within 10' of this pipe.

401-4.14 Joints. The formation of all joints shall be made to ensure a continuous bond between the courses and obtain the required density. All joints shall have the same texture as other sections of the course and meet the requirements for smoothness and grade.

The roller shall not pass over the unprotected end of the freshly laid asphalt except when necessary to form a transverse joint. When necessary to form a transverse joint, it shall be made by means of placing a bulkhead or by tapering the course. The tapered edge shall be cut back to its full depth and width on a straight line to expose a vertical face prior to placing the adjacent lane. In both methods, all contact surfaces shall be coated with an asphalt tack coat before placing any fresh asphalt against the joint.

Longitudinal joints which have been left exposed for more than four (4) hours; the surface temperature has cooled to less than 175°F (80°C**)**; or are irregular, damaged, uncompacted or otherwise defective shall be cut back with a cutting wheel or pavement saw a maximum of 3 inches (75 mm) to expose a clean, sound, uniform vertical surface for the full depth of the course. All cutback material and any laitance produced from cutting joints shall be removed from the project. Asphalt tack coat in accordance with P-603 shall be applied to the clean, dry joint prior to placing any additional fresh asphalt against the joint. The cost of this work shall be considered incidental to the cost of the asphalt.

401-4.15 Saw-cut grooving. Saw-cut grooves shall be provided as specified in Item P-621.

401-4.16 Diamond grinding. Diamond grinding shall be completed prior to pavement grooving. Diamond grinding shall be accomplished by sawing with saw blades impregnated with industrial diamond abrasive.

Diamond grinding shall be performed with a machine designed specifically for diamond grinding capable of cutting a path at least 3 feet (0.9 m) wide. The saw blades shall be 1/8-inch (3-mm) wide with a sufficient number of blades to create grooves between 0.090 and 0.130 inches (2 and 3.5 mm) wide; and peaks and ridges approximately 1/32 inch (1 mm) higher than the bottom of the grinding cut. The actual number of blades will be determined by the Contractor and depend on the hardness of the aggregate. Equipment or grinding procedures that cause ravels, aggregate fractures, spalls or disturbance to the pavement will not be permitted. Contractor shall demonstrate to the RPR that the grinding equipment will produce satisfactory results prior to making corrections to surfaces. Grinding will be tapered in all directions to provide smooth transitions to areas not requiring grinding. The slurry resulting from the grinding operation shall be continuously removed and the pavement left in a clean condition. The

Contractor shall apply a surface treatment per P-608 to all areas that have been subject to grinding.

401-4.17 Nighttime paving requirements. The Contractor shall provide adequate lighting during any nighttime construction. A lighting plan shall be submitted by the Contractor and approved by the RPR prior to the start of any nighttime work. All work shall be in accordance with the approved CSPP and lighting plan.

The lighting plan will address the following items:

a. All paving machines, rollers, distribution trucks and other vehicles required by the Contractor for his operations shall be equipped with artificial illumination sufficient to safely complete the work.

b. Minimum illumination level shall be twenty (20) horizontal foot-candles and maintained in the following areas:

(1) An area of 30 feet (~~9 m~~) wide by 30 feet (~~9 m~~) long immediately behind the paving machines during the operations of the machines.

(2) An area 15 feet (~~4.5 m~~) wide by 30 feet (~~9 m~~) long immediately in front and back of all rolling equipment, during operation of the equipment.

(3) An area 15 feet (~~4.5 m~~) wide by 15 feet (~~4.5 m~~) long at any point where an area is being tack coated prior to the placement of pavement.

c. As partial fulfillment of the above requirements, the Contractor shall furnish and use, complete artificial lighting units with a minimum capacity of 3,000 watt electric beam lights, affixed to all equipment in such a way to direct illumination on the area under construction.

d. A lighting plan must be submitted by the Contractor and approved by the Engineer prior to the start of any nighttime work.

If the Contractor places any out of specification mix in the project work area, the Contractor is required to remove it at its own expense, to the satisfaction of the RPR. If the Contractor has to continue placing non-payment HMA, as directed by the RPR, to make the surfaces safe for aircraft operations, the Contractor shall do so to the satisfaction of the RPR. It is the Contractor's responsibility to leave the facilities to be paved in a safe condition ready for aircraft operations. No consideration for extended closure time of the area being paved will be given. As a first order of work for the next paving shift, the Contractor shall remove all out of specification material and replace with approved material to the satisfaction of the Engineer. When the above situations occur, there will be no consideration given for additional construction time or payment for extra costs.

CONTRACTOR QUALITY CONTROL (CQC)

401-5.1 General. The Contractor shall develop a Contractor Quality Control Program (CQCP) in accordance with Item C-100. No partial payment will be made for materials without an approved CQCP.

401-5.2 Contractor quality control (QC) facilities. The Contractor shall provide or contract for testing facilities in accordance with Item C-100. The RPR shall be permitted unrestricted

access to inspect the Contractor's QC facilities and witness QC activities. The RPR will advise the Contractor in writing of any noted deficiencies concerning the QC facility, equipment, supplies, or testing personnel and procedures. When the deficiencies are serious enough to be adversely affecting the test results, the incorporation of the materials into the work shall be suspended immediately and will not be permitted to resume until the deficiencies are satisfactorily corrected.

401-5.3 Contractor QC testing. The Contractor shall perform all QC tests necessary to control the production and construction processes applicable to these specifications and as set forth in the approved CQCP. The testing program shall include, but not necessarily be limited to, tests for the control of asphalt content, aggregate gradation, temperatures, aggregate moisture, field compaction, and surface smoothness. A QC Testing Plan shall be developed as part of the CQCP.

a. Asphalt content. A minimum of two tests shall be performed per day in accordance with ASTM D6307 or ASTM D2172 for determination of asphalt content. When using ASTM D6307, the correction factor shall be determined as part of the first test performed at the beginning of plant production; and as part of every tenth test performed thereafter. The asphalt content for the day will be determined by averaging the test results.

b. Gradation. Aggregate gradations shall be determined a minimum of twice per day from mechanical analysis of extracted aggregate in accordance with ASTM D5444, ASTM C136, and ASTM C117.

c. Moisture content of aggregate. The moisture content of aggregate used for production shall be determined a minimum of once per day in accordance with ASTM C566.

d. Moisture content of asphalt. The moisture content shall be determined once per day in accordance with AASHTO T329 or ASTM D1461.

e. Temperatures. Temperatures shall be checked, at least four times per day, at necessary locations to determine the temperatures of the dryer, the asphalt binder in the storage tank, the asphalt at the plant, and the asphalt at the job site.

f. In-place density monitoring. The Contractor shall conduct any necessary testing to ensure that the specified density is being achieved. A nuclear gauge may be used to monitor the pavement density in accordance with ASTM D2950.

g. Smoothness for Contractor Quality Control.

The Contractor shall perform smoothness testing in transverse and longitudinal directions daily to verify that the construction processes are producing pavement with variances less than ¼ inch in 12 feet, identifying areas that may pond water which could lead to hydroplaning of aircraft. If the smoothness criteria is not met, appropriate changes and corrections to the construction process shall be made by the Contractor before construction continues

The Contractor may use a 12-foot (3.7 m) "straightedge, a rolling inclinometer meeting the requirements of ASTM E2133 or rolling external reference device that can simulate a 12-foot (3.7m) straightedge approved by the RPR. Straight-edge testing shall start with one-half the length of the straightedge at the edge of pavement section being tested and then moved ahead one-half the length of the straightedge for each successive measurement. Testing shall be continuous across all joints. The surface irregularity shall be determined by placing the freestanding (unleveled) straightedge on the pavement surface and allowing it to rest upon the two highest spots covered by its length, and measuring the maximum gap between the straightedge and the pavement surface in the area between the two high points. If the rolling

inclinometer or external reference device is used, the data may be evaluated using the FAA profile program, ProFAA, using the 12-foot straightedge simulation function.

Smoothness readings shall not be made across grade changes or cross slope transitions. The transition between new and existing pavement shall be evaluated separately for conformance with the plans.

(1) Transverse measurements. Transverse measurements shall be taken for each day's production placed. Transverse measurements shall be taken perpendicular to the pavement centerline each 50 feet (15 m) or more often as determined by the RPR. The joint between lanes shall be tested separately to facilitate smoothness between lanes.

(2) Longitudinal measurements. Longitudinal measurements shall be taken for each day's production placed. Longitudinal tests shall be parallel to the centerline of paving; at the center of paving lanes when widths of paving lanes are less than 20 feet (6 m); and at the third points of paving lanes when widths of paving lanes are 20 ft (6 m) or greater.

Deviations on the final surface course in either the transverse or longitudinal direction that will trap water greater than 1/4 inch (6 mm) shall be corrected with diamond grinding per paragraph 401-4.16 or by removing and replacing the surface course to full depth. Grinding shall be tapered in all directions to provide smooth transitions to areas not requiring grinding. All areas in which diamond grinding has been performed shall be subject to the final pavement thickness tolerances specified in paragraph 401-6.1d(3). Areas that have been ground shall be sealed with a surface treatment in accordance with Item P-608. To avoid the surface treatment creating any conflict with runway or taxiway markings, it may be necessary to seal a larger area.

Control charts shall be kept to show area of each day's placement and the percentage of corrective grinding required. Corrections to production and placement shall be initiated when corrective grinding is required. If the Contractor's machines and/or methods produce significant areas that need corrective actions in excess of 10 percent of a day's production, production shall be stopped until corrective measures are implemented by the Contractor.

h. Grade. Grade shall be evaluated daily to allow adjustments to paving operations when grade measurements do not meet specifications. As a minimum, grade shall be evaluated prior to and after the placement of the first lift and after placement of the surface lift.

Measurements will be taken at appropriate gradelines (as a minimum at center and edges of paving lane) and longitudinal spacing as shown on cross-sections and plans. The final surface of the pavement will not vary from the gradeline elevations and cross-sections shown on the plans by more than 1/2 inch (12 mm) vertically**.** The documentation will be provided by the Contractor to the RPR**.**

Areas with humps or depressions that exceed grade or smoothness criteria and that retain water on the surface must be ground off provided the course thickness after grinding is not more than 1/2 inch (12 mm) less than the thickness specified on the plans. Grinding shall be in accordance with paragraph 401-4.16.

The Contractor shall repair low areas or areas that cannot be corrected by grinding by removal of deficient areas to the depth of the final course plus ½ inch and replacing with new material. Skin patching is not allowed.

401-5.4 Sampling. When directed by the RPR, the Contractor shall sample and test any material that appears inconsistent with similar material being sampled, unless such material is

voluntarily removed and replaced or deficiencies corrected by the Contractor. All sampling shall be in accordance with standard procedures specified.

401-5.5 Control charts. The Contractor shall maintain linear control charts for both individual measurements and range (i.e. difference between highest and lowest measurements) for aggregate gradation, asphalt content, and VMA. The VMA for each day will be calculated and monitored by the QC laboratory.

Control charts shall be posted in a location satisfactory to the RPR and kept current. As a minimum, the control charts shall identify the project number, the contract item number, the test number, each test parameter, the Action and Suspension Limits applicable to each test parameter, and the Contractor's test results. The Contractor shall use the control charts as part of a process control system for identifying potential problems and assignable causes before they occur. If the Contractor's projected data during production indicates a problem and the Contractor is not taking satisfactory corrective action, the RPR may suspend production or acceptance of the material.

a. Individual measurements. Control charts for individual measurements shall be established to maintain process control within tolerance for aggregate gradation, asphalt content, and VMA. The control charts shall use the job mix formula target values as indicators of central tendency for the following test parameters with associated Action and Suspension Limits:

Control Chart Limits for Individual Measurements

Sieve	Action Limit	Suspension Limit
3/4 inch (19.0 mm)	±6%	±9%
1/2 inch (12.5 mm)	±6%	±9%
3/8 inch (9.5 mm)	±6%	±9%
No. 4 (4.75 mm)	±6%	±9%
No. 16 (1.18 mm)	±5%	±7.5%
No. 50 (300 µm)	±3%	±4.5%
No. 200 (75 µm)	±2%	±3%
Asphalt Content	±0.45%	±0.70%
Minimum VMA	-0.5%	-1.0%

b. Range. Control charts shall be established to control gradation process variability. The range shall be plotted as the difference between the two test results for each control parameter. The Suspension Limits specified below are based on a sample size of n = 2. Should the Contractor elect to perform more than two tests per lot, the Suspension Limits shall be adjusted by multiplying the Suspension Limit by 1.18 for n = 3 and by 1.27 for n = 4.

Control Chart Limits Based on Range

Sieve	Suspension Limit
1/2 inch (12.5 mm)	11%
3/8 inch (9.5 mm)	11%
No. 4 (4.75 mm)	11%
No. 16 (1.18 mm)	9%
No. 50 (300 µm)	6%
No. 200 (75 µm)	3.5%
Asphalt Content	0.8%

c. Corrective Action. [The CQCP shall indicate that appropriate action shall be taken when the process is believed to be out of tolerance. The Plan shall contain rules to gauge when a process is out of control and detail what action will be taken to bring the process into control. As a minimum, a process shall be deemed out of control and production stopped and corrective action taken, if:

(1) One point falls outside the Suspension Limit line for individual measurements or range; or

(2) Two points in a row fall outside the Action Limit line for individual measurements.

401-5.6 QC reports. The Contractor shall maintain records and shall submit reports of QC activities daily, in accordance with Item C-100 .

MATERIAL ACCEPTANCE

401-6.1 Acceptance sampling and testing. Unless otherwise specified, all acceptance sampling and testing necessary to determine conformance with the requirements specified in this section will be performed by the RPR at no cost to the Contractor except that coring as required in this section shall be completed and paid for by the Contractor. ***Coring of the in-place pavement, which will be performed by the Contractor, will include patching of the hole and delivery of cores to the RPR or his agent for testing.***

a. Quality assurance (QA) testing laboratory. The QA testing laboratory performing these acceptance tests will be accredited in accordance with ASTM D3666. The QA laboratory accreditation will be current and listed on the accrediting authority's website. All test methods required for acceptance sampling and testing will be listed on the lab accreditation.

b. Lot size. A standard lot will be equal to one day's production divided into approximately equal sublots of between 400 to 600 tons. When only one or two sublots are produced in a

day's production, the sublots will be combined with the production lot from the previous or next day.

Where more than one plant is simultaneously producing asphalt for the job, the lot sizes will apply separately for each plant.

c. Asphalt air voids. Plant-produced asphalt will be tested for air voids on a sublot basis.

(1) Sampling. Material from each sublot shall be sampled in accordance with ASTM D3665. Samples shall be taken from material deposited into trucks at the plant or at the job site in accordance with ASTM D979. The sample of asphalt may be put in a covered metal tin and placed in an oven for not less than 30 minutes nor more than 60 minutes to maintain the material at or above the compaction temperature as specified in the JMF. ***For mixtures containing aggregates with absorption values greater than 1.5%, the mixture shall be maintained at a temperature at or above the specified compaction temperature for a period of not less than 60 minutes nor more than 90 minutes to stabilize to compaction temperatures.***

(2) Testing. Air voids will be determined for each sublot in accordance with ASTM D3203 for a set of compacted specimens prepared in accordance with ASTM D6925.

d. In-place asphalt mat and joint density. Each sublot will be tested for in-place mat and joint density as a percentage of the theoretical maximum density (TMD).

(1) Sampling. The Contractor will cut minimum 5 inch (125 mm) diameter samples in accordance with ASTM D5361. The Contractor shall furnish all tools, labor, and materials for cleaning, and filling the cored pavement. Laitance produced by the coring operation shall be removed immediately after coring, and core holes shall be filled within one day after sampling in a manner acceptable to the RPR.

(2) Bond. Each lift of asphalt shall be bonded to the underlying layer. If cores reveal that the surface is not bonded, additional cores shall be taken as directed by the RPR to determine the extent of unbonded areas. Unbonded areas shall be removed by milling and replaced at no additional cost as directed by the RPR.

(3) Thickness. Thickness of each lift of surface course will be evaluated by the RPR for compliance to the requirements shown on the plans after any necessary corrections for grade. Measurements of thickness will be made using the cores extracted for each sublot for density measurement. The maximum allowable deficiency at any point will not be more than 1/4 inch (6 mm) less than the thickness indicated for the lift. Average thickness of lift, or combined lifts, will not be less than the indicated thickness. Where the thickness tolerances are not met, the lot or sublot shall be corrected by the Contractor at his expense by removing the deficient area and replacing with new pavement. The Contractor, at his expense, may take additional cores as approved by the RPR to circumscribe the deficient area.

(4) Mat density. One core shall be taken from each sublot. Core locations will be determined by the RPR in accordance with ASTM D3665. Cores for mat density shall not be taken closer than one foot (30 cm) from a transverse or longitudinal joint. The bulk specific gravity of each cored sample will be determined in accordance with ASTM D2726. The percent compaction (density) of each sample will be determined by dividing the bulk specific gravity of each sublot sample by the TMD for that sublot.

(5) Joint density. One core centered over the longitudinal joint shall be taken for each sublot that has a longitudinal joint. Core locations will be determined by the RPR in accordance with ASTM D3665. The bulk specific gravity of each core sample will be determined in accordance with ASTM D2726. The percent compaction (density) of each sample will be determined by dividing the bulk specific gravity of each joint density sample by the average

TMD for the lot. The TMD used to determine the joint density at joints formed between lots will be the lower of the average TMD values from the adjacent lots.

401-6.2 Acceptance criteria.

a. General. Acceptance will be based on the implementation of the Contractor Quality Control Program (CQCP) and the following characteristics of the asphalt and completed pavements: air voids, mat density, joint density, grade and Profilograph roughness**.**

b. Air Voids and Mat density. Acceptance of each lot of plant produced material for mat density and air voids will be based on the percentage of material within specification limits (PWL). If the PWL of the lot equals or exceeds 90%, the lot will be acceptable. Acceptance and payment will be determined in accordance with paragraph 401-8.1.

c. Joint density. Acceptance of each lot of plant produced asphalt for joint density will be based on the PWL. If the PWL of the lot is equal to or exceeds 90%, the lot will be considered acceptable. If the PWL is less than 90%, the Contractor shall evaluate the reason and act accordingly. If the PWL is less than 80%, the Contractor shall cease operations and until the reason for poor compaction has been determined. If the PWL is less than 71%, the pay factor for the lot used to complete the joint will be reduced by five (5) percentage points. This lot pay factor reduction will be incorporated and evaluated in accordance with paragraph 401-8.1.

d. Grade. The final finished surface of the pavement shall be surveyed to verify that the grade elevations and cross-sections shown on the plans do not deviate more than 1/2 inch (12 mm) vertically.

Cross-sections of the pavement shall be taken at a minimum 50-foot longitudinal spacing and at all longitudinal grade breaks. Minimum cross-section grade points shall include grade at centerline, ± 10 feet of centerline, and edge of runway **or** taxiway pavement.

The survey and documentation shall be stamped and signed by a licensed surveyor. Payment for sublots that do not meet grade for over 25% of the sublot shall not be more than 95%.

e. Profilograph roughness for QA Acceptance. The final profilograph shall be the full length of the project to facilitate testing of roughness between lots. The Contractor, in the presence of the RPR shall perform a profilograph roughness test on the completed project with a profilograph meeting the requirements of ASTM E1274 or a Class I inertial profiler meeting ASTM E950. Data and results shall be provided within 48 hrs of profilograph roughness tests.

The pavement shall have an average profile index less than 15 inches per mile per 1/10 mile. The equipment shall utilize electronic recording and automatic computerized reduction of data to indicate “must grind” bumps and the Profile Index for the pavement using a 0.2-inch (5 mm) blanking band. The bump template must span one inch (25 mm) with an offset of 0.4 inches (10 mm). The profilograph must be calibrated prior to use and operated by a factory or State DOT approved, trained operator. Profilograms shall be recorded on a longitudinal scale of one inch (25 mm) equals 25 feet (7.5 m) and a vertical scale of one inch (25 mm) equals one inch (25 mm). Profilograph shall be performed one foot right and left of project centerline and 15 feet (4.5 m) right and left of project centerline. Any areas that indicate “must grind” shall be corrected with diamond grinding per paragraph 401-4.16 or by removing and replacing full depth of surface course. as directed by the RPR. Where corrections are necessary, a second

profilograph run shall be performed to verify that the corrections produced an average profile index of 15 inches per mile per 1/10 mile or less.

401-6.3 Percentage of material within specification limits (PWL). The PWL will be determined in accordance with procedures specified in Item C-110. The specification tolerance limits (L) for lower and (U) for upper are contained in Table 5.

Table 5. Acceptance Limits for Air Voids and Density

Test Property	Pavements Specification Tolerance Limits	
	L	U
Air Voids Total Mix (%)	2.0	5.0
Surface Course Mat Density (%)	92.8	-
Base Course Mat Density (%)	92.0	-
Joint density (%)	90.5	--

a. Outliers. All individual tests for mat density and air voids will be checked for outliers (test criterion) in accordance with ASTM E178, at a significance level of 5%. Outliers will be discarded, and the PWL will be determined using the remaining test values. The criteria in Table 5 is based on production processes which have a variability with the following standard deviations: Surface Course Mat Density (%), 1.30; Base Course Mat Density (%), 1.55; Joint Density (%), 1.55.

The Contractor should note that (1) 90 PWL is achieved when consistently producing a surface course with an average mat density of at least 94.5% with 1.30% or less variability, (2) 90 PWL is achieved when consistently producing a base course with an average mat density of at least 94.0% with 1.55% or less variability, and (3) 90 PWL is achieved when consistently producing joints with an average joint density of at least 92.5% with 1.55% or less variability.

401-6.4 Resampling pavement for mat density.

a. General. Resampling of a lot of pavement will only be allowed for mat density, and then, only if the Contractor requests same, in writing, within 48 hours after receiving the written test results from the RPR. A retest will consist of all the sampling and testing procedures contained in paragraphs 401-6.1d and 401-6.2b. Only one resampling per lot will be permitted.

(1) A redefined PWL will be calculated for the resampled lot. The number of tests used to calculate the redefined PWL will include the initial tests made for that lot plus the retests.

(2) The cost for resampling and retesting shall be borne by the Contractor.

b. Payment for resampled lots. The redefined PWL for a resampled lot will be used to calculate the payment for that lot in accordance with Table 6.

c. Outliers. Check for outliers in accordance with ASTM E178, at a significance level of 5%.

401-6.5 Leveling course. The leveling course is the first variable thickness lift placed to correct surface irregularities prior to placement of subsequent courses. The leveling course shall meet the aggregate gradation in Table 2, paragraph 401-3.3. The leveling course shall meet the requirements of paragraph 401-3.3, 401-6.2b for air voids, but shall not be subject to the density requirements of paragraph 401-6.2b for mat density and 401-6.2c for joint density. The leveling course shall be compacted with the same effort used to achieve density of the control strip. The

leveling course shall not exceed the maximum lift thickness associated with each gradation in Table 2, paragraph 401-3.3.

METHOD OF MEASUREMENT

401-7.1 Measurement. Asphalt shall be measured by the number of tons ~~kg~~ of asphalt used in the accepted work. Batch weights or truck scale weights will be used to determine the basis for the tonnage.

BASIS OF PAYMENT

401-8.1 Payment. Payment for a lot of asphalt meeting all acceptance criteria as specified in paragraph 401-6.2 shall be made based on results of tests for mat density and air voids. Payment for acceptable lots shall be adjusted according to paragraph 401-8.1c for mat density and air voids; and paragraph 401-6.2c for joint density, subject to the limitation that:

a. The total project payment for plant mix asphalt pavement shall not exceed **100%** percent of the product of the contract unit price and the total number of tons (kg) of asphalt used in the accepted work.

b. The price shall be compensation for furnishing all materials, for all preparation, mixing, and placing of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

c. Basis of adjusted payment. The pay factor for each individual lot shall be calculated in accordance with Table 6. A pay factor shall be calculated for both mat density and air voids. The lot pay factor shall be the higher of the two values when calculations for both mat density and air voids are 100% or higher. The lot pay factor shall be the product of the two values when only one of the calculations for either mat density or air voids is 100% or higher. The lot pay factor shall be the lower of the two values when calculations for both mat density and air voids are less than 100%. If PWL for joint density is less than 71% then the lot pay factor shall be reduced by 5% but be no higher than 95%.

For each lot accepted, the adjusted contract unit price shall be the product of the lot pay factor for the lot and the contract unit price. Payment shall be subject to the total project payment limitation specified in paragraph 401-8.1a. Payment in excess of 100% for accepted lots of asphalt shall be used to offset payment for accepted lots of asphalt pavement that achieve a lot pay factor less than 100%.

Payment for sublots which do not meet grade in accordance with paragraph 401-6.2d after correction for over 25% of the sublot shall be reduced by 5%.

Table 6. Price adjustment schedule[1]

Percentage of material within specification limits (PWL)	Lot pay factor (percent of contract unit price)
96 – 100	106
90 – 95	PWL + 10
75 – 89	0.5 PWL + 55
55 – 74	1.4 PWL – 12
Below 55	Reject [2]

[1] Although it is theoretically possible to achieve a pay factor of 106% for each lot, actual payment above 100% shall be subject to the total project payment limitation specified in paragraph 401-8.1a.

[2] The lot shall be removed and replaced. However, the RPR may decide to allow the rejected lot to remain. In that case, if the RPR and Contractor agree in writing that the lot shall not be removed, it shall be paid for at 50% of the contract unit price and the total project payment shall be reduced by the amount withheld for the rejected lot.

d. Profilograph Roughness. The Contractor will receive full payment when the profilograph average profile index is in accordance with paragraph 401-6.2e. When the final average profile index for the entire length of pavement does not exceed 15 inches per mile per 1/10 mile, payment will be made at the contract unit price for the completed pavement.

401-8.1 Payment.

Payment will be made under:

Item P-401-8.1 Hot Mixed Asphalt Pavement – per Ton

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM C29	Standard Test Method for Bulk Density (“Unit Weight”) and Voids in Aggregate
ASTM C88	Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C117	Standard Test Method for Materials Finer than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C127	Standard Test Method for Density, Relative Density (Specific Gravity) and Absorption of Coarse Aggregate
ASTM C131	Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine

ASTM C136	Standard Test Method for Sieve or Screen Analysis of Fine and Coarse Aggregates
ASTM C142	Standard Test Method for Clay Lumps and Friable Particles in Aggregates
ASTM C566	Standard Test Method for Total Evaporable Moisture Content of Aggregate by Drying
ASTM D75	Standard Practice for Sampling Aggregates
ASTM D242	Standard Specification for Mineral Filler for Bituminous Paving Mixtures
ASTM D946	Standard Specification for Penetration-Graded Asphalt Cement for Use in Pavement Construction
ASTM D979	Standard Practice for Sampling Asphalt Paving Mixtures
ASTM D1073	Standard Specification for Fine Aggregate for Asphalt Paving Mixtures
ASTM D1188	Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Coated Samples
ASTM D2172	Standard Test Method for Quantitative Extraction of Bitumen from Asphalt Paving Mixtures
ASTM D1461	Standard Test Method for Moisture or Volatile Distillates in Asphalt Paving Mixtures
ASTM D2041	Standard Test Method for Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures
ASTM D2419	Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate
ASTM D2489	Standard Practice for Estimating Degree of Particle Coating of Bituminous-Aggregate Mixtures
ASTM D2726	Standard Test Method for Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures
ASTM D2950	Standard Test Method for Density of Bituminous Concrete in Place by Nuclear Methods
ASTM D3203	Standard Test Method for Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures
ASTM D3381	Standard Specification for Viscosity-Graded Asphalt Cement for Use in Pavement Construction
ASTM D3665	Standard Practice for Random Sampling of Construction Materials
ASTM D3666	Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials

ASTM D4318	Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D4552	Standard Practice for Classifying Hot-Mix Recycling Agents
ASTM D4791	Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate
ASTM D4867	Standard Test Method for Effect of Moisture on Asphalt Concrete Paving Mixtures
ASTM D5361	Standard Practice for Sampling Compacted Asphalt Mixtures for Laboratory Testing
ASTM D5444	Standard Test Method for Mechanical Size Analysis of Extracted Aggregate
ASTM D5821	Standard Test Method for Determining the Percentage of Fractured Particles in Coarse Aggregate
ASTM D6084	Standard Test Method for Elastic Recovery of Bituminous Materials by Ductilometer
ASTM D6307	Standard Test Method for Asphalt Content of Hot Mix Asphalt by Ignition Method
ASTM D6373	Standard Specification for Performance Graded Asphalt Binder
ASTM D6752	Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Automatic Vacuum Sealing Method
ASTM D6925	Standard Test Method for Preparation and Determination of the Relative Density of Hot Mix Asphalt (HMA) Specimens by Means of the SuperPave Gyratory Compactor.
ASTM D6926	Standard Practice for Preparation of Bituminous Specimens Using Marshall Apparatus
ASTM D6927	Standard Test Method for Marshall Stability and Flow of Bituminous Mixtures
ASTM D 6931	***Indirect Tensile (IDT) Strength of Bituminous Mixtures***
ASTM D6995	Standard Test Method for Determining Field VMA based on the Maximum Specific Gravity of the Mix (Gmm)
ASTM E11	Standard Specification for Woven Wire Test Sieve Cloth and Test Sieves
ASTM E178	Standard Practice for Dealing with Outlying Observations
ASTM E1274	Standard Test Method for Measuring Pavement Roughness Using a Profilograph
ASTM E950	Standard Test Method for Measuring the Longitudinal Profile of Traveled Surfaces with an Accelerometer Established Inertial Profiling Reference
ASTM E2133	Standard Test Method for Using a Rolling Inclinometer to Measure Longitudinal and Transverse Profiles of a Traveled Surface

American Association of State Highway and Transportation Officials (AASHTO)

AASHTO M156	Standard Specification for Requirements for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures.
AASHTO T329	Standard Method of Test for Moisture Content of Hot Mix Asphalt (HMA) by Oven Method
AASHTO T324	Standard Method of Test for Hamburg Wheel-Track Testing of Compacted Asphalt Mixtures
AASHTO T 340	Standard Method of Test for Determining the Rutting Susceptibility of Hot Mix Asphalt (APA) Using the Asphalt Pavement Analyzer (APA)

Asphalt Institute (AI)

Asphalt Institute Handbook MS-26, Asphalt Binder

Asphalt Institute MS-2Mix Design Manual, 7th Edition

AI State Binder Specification Database

Federal Highway Administration (FHWA)

Long Term Pavement Performance Binder Program

Advisory Circulars (AC)

AC 150/5320-6	Airport Pavement Design and Evaluation

FAA Orders

5300.1	Modifications to Agency Airport Design, Construction, and Equipment Standards

Software

FAARFIELD

END OF ITEM P-401

ITEM P-602 EMULSIFIED ASPHALT PRIME COAT

DESCRIPTION

602-1.1 This item shall consist of an application of emulsified asphalt material on the prepared base course in accordance with these specifications and in reasonably close conformity to the lines shown on the plans.

MATERIALS

602-2.1 Emulsified Asphalt material. The emulsified asphalt material shall be as specified in ASTM D3628 for use as a prime coat appropriate to local conditions. The Contractor shall provide a copy of the manufacturer's Certificate of Analysis (COA) for the emulsified asphalt material. The COA shall be provided to and approved by the Resident Project Representative (RPR) before the emulsified asphalt material is applied. The furnishing of the COA for the emulsified asphalt material shall not be interpreted as a basis for final acceptance. The manufacturer's COA may be subject to verification by testing the material delivered for use on the project. ***The designated material for this project is Emulsified Asphalt, SS-1h or SS-1.***

CONSTRUCTION METHODS

602-3.1 Weather limitations. The emulsified asphalt prime coat shall be applied only when the existing surface is dry; the atmospheric temperature is 50°F (10°C) or above, and the temperature has not been below 35°F (2°C) for the 12 hours prior to application; and when the weather is not foggy or rainy. The temperature requirements may be waived when directed by the RPR.

602-3.2 Equipment. The equipment shall include a self-powered pressure asphalt material distributor and equipment for heating asphalt material.

Provide a distributor with pneumatic tires of such size and number that the load produced on the base surface does not exceed 65.0 psi (~~4.5 kg/sq cm~~) of tire width to prevent rutting, shoving or otherwise damaging the base, surface or other layers in the pavement structure. Design and equip the distributor to spray the asphalt material in a uniform coverage at the specified temperature, at readily determined and controlled rates from 0.05 to 1.0 gallons per square yard (~~0.23 to 4.5 L/square meter~~), with a pressure range of 25 to 75 psi (~~172.4 to 517.1 kPa~~) and with an allowable variation from the specified rate of not more than ±5%, and at variable widths. Include with the distributor equipment a separate power unit for the bitumen pump, full-circulation spray bars, tachometer, pressure gauges, volume-measuring devices, adequate heaters for heating of materials to the proper application temperature, a thermometer for reading the temperature of tank contents, and a hand hose attachment suitable for applying asphalt material manually to areas inaccessible to the distributor. Equip the distributor to circulate and agitate the asphalt material during the heating process. If the distributor is not equipped with an operable quick shutoff valve, the prime operations shall be started and stopped on building paper.

A power broom and power blower suitable for cleaning the surfaces to which the asphalt coat is to be applied shall be provided.

Asphalt distributors must be calibrated annually in accordance with ASTM D2995. The Contractor must furnish a current calibration certification for the asphalt distributor truck from any State or other agency as approved by the RPR.

602-3.3 Application of emulsified asphalt material. Immediately before applying the prime coat, the full width of the surface to be primed shall be swept with a power broom to remove all loose dirt and other objectionable material.

The asphalt emulsion material shall be uniformly applied with an asphalt distributor at the rate of 0.15 to 0.30 gallons per square yard (~~0.68 to 1.36 liters per square meter~~) depending on the base course surface texture. The type of asphalt material and application rate shall be approved by the RPR prior to application.

Following application of the emulsified asphalt material and prior to application of the succeeding layer of pavement, allow the asphalt coat to cure and to obtain evaporation of any volatiles or moisture. Maintain the coated surface until the succeeding layer of pavement is placed, by protecting the surface against damage and by repairing and recoating deficient areas. Allow the prime coat to cure without being disturbed for a period of at least 48 hours or longer, as may be necessary to attain penetration into the treated course. Furnish and spread sand to effectively blot up and cure excess asphalt material. The Contractor shall remove blotting sand prior to asphalt concrete lay down operations at no additional expense to the Owner. Keep traffic off surfaces freshly treated with asphalt material. Provide sufficient warning signs and barricades so that traffic will not travel over freshly treated surfaces.

602-3.4 Trial application rates. The Contractor shall apply a minimum of three lengths of at least 100 feet (30 m) for the full width of the distributor bar to evaluate the amount of emulsified asphalt material that can be satisfactorily applied with the equipment. Apply three different application rates of emulsified asphalt materials within the application range specified in paragraph 602-3.3. Other trial applications can be made using various amounts of material as directed by the RPR. The trial application is to demonstrate the equipment can uniformly apply the emulsified asphalt material within the rates specified and determine the application rate for the project.

602-3.5 Freight and waybills. The Contractor shall submit waybills and delivery tickets during the progress of the work. Before the final estimate is allowed, file with the RPR certified waybills and certified delivery tickets for all emulsified asphalt materials used in the construction of the pavement covered by the contract. Do not remove emulsified asphalt material from storage until the initial outage and temperature measurements have been taken. The delivery or storage units will not be released until the final outage has been taken. ***Waybills and delivery tickets must be submitted prior to the delivery truck's departure. No waybills and delivery tickets will be accepted after the fact. Any delivery trucks departing prior to submitting their waybill and delivery ticket will not be measured for payment.***

METHOD OF MEASUREMENT

602-4.1 The emulsified asphalt material for prime coat shall be measured by the gallon. Volume shall be corrected to the volume at 60°F (~~16°C~~) in accordance with ASTM D4311. The emulsified asphalt material paid for will be the measured quantities used in the accepted work, provided that the measured quantities are not 10% over the specified application rate. Any amount of emulsified asphalt material more than 10% over the specified application rate for

each application will be deducted from the measured quantities, except for irregular areas where hand spraying of the emulsified asphalt material is necessary. Water added to emulsified asphalt will not be measured for payment.

BASIS OF PAYMENT

602-5.1 Payment shall be made at the contract unit price per gallon for emulsified asphalt prime coat. This price shall be full compensation for furnishing all materials and for all preparation, delivering, and applying the materials, and for all labor, equipment, tools, and incidentals necessary to complete this item.

Payment will be made under:

Item P-602-5.1	Emulsified Asphalt Prime Coat - per gallon

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM D2995	Standard Practice for Estimating Application Rate and Residual Application Rate of Bituminous Distributors
ASTM D3628	Standard Practice for Selection and Use of Emulsified Asphalts

END OF ITEM P-602

ITEM P-603 EMULSIFIED ASPHALT TACK COAT

DESCRIPTION

603-1.1 This item shall consist of preparing and treating an asphalt or concrete surface with asphalt material in accordance with these specifications and in reasonably close conformity to the lines shown on the plans.

MATERIALS

603-2.1 Asphalt materials. The asphalt material shall be an emulsified asphalt as specified in ASTM D3628 as an asphalt application for tack coat appropriate to local conditions. The emulsified asphalt shall not be diluted. The Contractor shall provide a copy of the manufacturer's Certificate of Analysis (COA) for the asphalt material to the Resident Project Representative (RPR) before the asphalt material is applied for review and acceptance. The furnishing of COA for the asphalt material shall not be interpreted as a basis for final acceptance. The manufacturer's COA may be subject to verification by testing the material delivered for use on the project. ***The designated material for this project is Emulsified Asphalt, SS-1h, or RS-1 or approved equivalent. If RS-1 is used, application temperature must be between 140°F-180°F. To use RS-1 at night, the Contractor must demonstrate, at time of use, that emulsion will break to allow paving in a timely manner.***

CONSTRUCTION METHODS

603-3.1 Weather limitations. The tack coat shall be applied only when the existing surface is dry and the atmospheric temperature is 50°F (10°C) or above; the temperature has not been below 35°F (2°C) for the 12 hours prior to application; and when the weather is not foggy or rainy. The temperature requirements may be waived when directed by the RPR.

603-3.2 Equipment. The Contractor shall provide equipment for heating and applying the emulsified asphalt material. The emulsion shall be applied with a manufacturer-approved computer rate-controlled asphalt distributor. The equipment shall be in good working order and contain no contaminants or diluents in the tank. Spray bar tips must be clean, free of burrs, and of a size to maintain an even distribution of the emulsion. Any type of tip or pressure source is suitable that will maintain predetermined flow rates and constant pressure during the application process with application speeds under eight (8) miles per hour (13 km per hour) or seven (700) feet per minute (213 m per minute).

The equipment will be tested under pressure for leaks and to ensure proper set-up before use to verify truck set-up (via a test-shot area), including but not limited to, nozzle tip size appropriate for application, spray-bar height and pressure and pump speed, evidence of triple-overlap spray pattern, lack of leaks, and any other factors relevant to ensure the truck is in good working order before use.

The distributor truck shall be equipped with a minimum 12-foot (3.7-m) spreader spray bar with individual nozzle control with computer-controlled application rates. The distributor truck shall

have an easily accessible thermometer that constantly monitors the temperature of the emulsion, and have an operable mechanical tank gauge that can be used to cross-check the computer accuracy. If the distributor is not equipped with an operable quick shutoff valve, the prime operations shall be started and stopped on building paper.

The distributor truck shall be equipped to effectively heat and mix the material to the required temperature prior to application as required. Heating and mixing shall be done in accordance with the manufacturer's recommendations. Do not overheat or over mix the material.

The distributor shall be equipped with a hand sprayer.

Asphalt distributors must be calibrated annually in accordance with ASTM D2995. The Contractor must furnish a current calibration certification for the asphalt distributor truck from any State or other agency as approved by the RPR.

A power broom and/or power blower suitable for cleaning the surfaces to which the asphalt tack coat is to be applied shall be provided.

603-3.3 Application of emulsified asphalt material. The emulsified asphalt shall not be diluted. Immediately before applying the emulsified asphalt tack coat, the full width of surface to be treated shall be swept with a power broom and/or power blower to remove all loose dirt and other objectionable material.

The emulsified asphalt material shall be uniformly applied with an asphalt distributor at the rates appropriate for the conditions and surface specified in the table below. The type of asphalt material and application rate shall be approved by the RPR prior to application.

Emulsified Asphalt

Surface Type	Residual Rate, gal/SY (L/square meter)	Emulsion Application Bar Rate, gal/SY (L/square meter)
New asphalt	0.02-0.05 (0.09-0.23)	0.03-0.07 (0.13-0.32)
Existing asphalt	0.04-0.07 (0.18-0.32)	0.06-0.11 (0.27-0.50)
Milled Surface	0.04-0.08 (0.18-0.36)	.0.06-0.12 (0.27-0.54)
Concrete	0.03-0.05 (0.13-0.23)	0.05-0.08 (0.23-0.36)

After application of the tack coat, the surface shall be allowed to cure without being disturbed for the period of time necessary to permit drying and setting of the tack coat. This period shall be determined by the RPR. The Contractor shall protect the tack coat and maintain the surface until the next course has been placed. When the tack coat has been disturbed by the Contractor, tack coat shall be reapplied at the Contractor's expense.

603-3.4 Freight and waybills The Contractor shall submit waybills and delivery tickets, during progress of the work. Before the final statement is allowed, file with the RPR certified waybills and certified delivery tickets for all emulsified asphalt materials used in the construction of the pavement covered by the contract. Do not remove emulsified asphalt material from storage until the initial outage and temperature measurements have been taken. The delivery or storage units will not be released until the final outage has been taken. ***Waybills and delivery tickets must be submitted prior to the delivery truck's departure. No waybills and delivery***

tickets will be accepted after the fact. Any delivery trucks departing prior to submitting their waybill and delivery ticket will not be measured for payment.

METHOD OF MEASUREMENT

603-4.1 The emulsified asphalt material for tack coat shall be measured by the gallon. Volume shall be corrected to the volume at 60°F (16°C) in accordance with ASTM D1250. The emulsified asphalt material paid for will be the measured quantities used in the accepted work, provided that the measured quantities are not 10% over the specified application rate. Any amount of emulsified asphalt material more than 10% over the specified application rate for each application will be deducted from the measured quantities, except for irregular areas where hand spraying of the emulsified asphalt material is necessary. Water added to emulsified asphalt will not be measured for payment.

BASIS OF PAYMENT

603.5-1 Payment shall be made at the contract unit price per gallon of emulsified asphalt material. This price shall be full compensation for furnishing all materials, for all preparation, delivery, and application of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item P-603-5.1	Emulsified Asphalt Tack Coat – per gallon

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM D1250	Standard Guide for Use of the Petroleum Measurement Tables
ASTM D2995	Standard Practice for Estimating Application Rate and Residual Application Rate of Bituminous Distributors
ASTM D3628	Standard Practice for Selection and Use of Emulsified Asphalts

END ITEM P-603

ITEM P-605 JOINT SEALANTS FOR PAVEMENTS

DESCRIPTION

605-1.1 This item shall consist of providing and installing a resilient and adhesive joint sealing material capable of effectively sealing joints in pavement; joints between different types of pavements; and cracks in existing pavement.

605-1.2 This item shall also consist of a resilient and adhesive joint sealing filler capable of effectively sealing joints in Portland Cement Concrete pavements and structures. The item shall consist of low modulus silicone sealant in accordance with this section for all concrete pavement.

MATERIALS

605-2.1 Joint sealants. Joint sealant materials shall meet the requirements of ***ASTM D5893 and as specified or approved equal.***

Certification: The manufacturer of the joint sealant shall furnish certified test results of each lot of the joint sealer material furnished to the project. Each lot of the sealant shall be delivered in containers plainly marked with manufacturer's name or trade mark and lot number.

Each lot or batch of sealant shall be delivered to the jobsite in the manufacturer's original sealed container. Each container shall be marked with the manufacturer's name, ***name of material, shelf life, storage instructions, mixing instructions,*** batch or lot number, the safe heating temperature, and shall be accompanied by the manufacturer's certification stating that the sealant meets the requirements of this specification.

The Joint Sealant Material used for sealing Portland Cement Concrete to Portland Cement Concrete joints and cracks as shown on the plans shall be cold applied, single component, non sag, Dow Corning 888 Silicone Joint Sealant or approved equal.

Silicone sealant (non-acid curing) material shall meet the requirements shown in Table 1.

TABLE 1 - NON-SAG SILICONE SEALANT REQUIREMENT

Test Method	***Test***	***Material Requirement***
As Supplied:		
ASTM 2202	***Flow, Maximum***	***0.2***
ASTM D 1475	***Specific Gravity***	***1.450 to 1.515***
ASTM C 1183	***Extrusion Rate***	***50 Min***

ASTM 679	***Tack-Free Time, Minutes***	***35 to 75***

Upon Complete Cure:

ASTM D 2240	***Durometer (1)***	***15 to 25***
ASTM D 412, Die C	***Modulus, at 150% Elongation(1), psi, Maximum***	***45***
ASTM D 412, Die C	***Elongation(1), Minimum***	***1200***
ASTM D 5329	***Adhesion to Concrete, Minimum % Elongation***	***500***

Performance:

ASTM C 719(2)	***Movement, 10 Cycles at +100/-50%***	***No Failure***
ASTM D 793	***Accelerated Weathering at 5,000 Hours***	***No Cracks, Blisters or Bond Loss***

(1) Sample cured 7 days at 77 º F ±2 º F and 50 ±5% relative humidity. Proper joint design and proper joint preparation are necessary for maximum performance.

(2) Tested on random samples at least on a quarterly basis. The RPR shall have additional tests performed in accordance with ASTM C 719 on random samples taken from material supplied to the work. Material not passing the test shall be removed and replaced at the Contractor's cost.

The Joint Sealant Material used for sealing Portland Cement Concrete to Asphalt Concrete Pavement joints as shown on the plans shall be cold applied, single component, self-leveling, Dow Corning 890-SL Silicone Joint Sealant or approved equal. Silicone sealant (non-acid curing) material shall meet the requirements shown in Table 2.

TABLE 2. SELF LEVELING SILICONE SEALANT REQUIREMENTS

Test Method	***Test***	***Materials Requirement***
As Supplied:		
ASTM D 1475	***Specific Gravity***	***1.26 to 1.34***
ASTM C 1183	***Extrusion Rate***	***50 Min***
CTM 0098	***Skin Over Time, Minutes, Maximum***	***60***
CTM 0208	***Non-Volatile Content, Minimum***	***96***
Upon Complete Cure:		
ASTM D 412, Die C (modified)	***Elongation(1), % Minimum***	***1400***
ASTM D 5329	***Joint modulus at 50% elongation(1), psi, Maximum***	***7***
	Joint modulus at 100% elongation(1), psi, Maximum	***8***
	Joint modulus at 150% elongation(1), psi, Maximum	***9***
ASTM D 5329	***Adhesion to Asphalt/Concrete (1) elongation***	***600 min.***

Performance:

ASTM C 719	***Movement, 10 Cycles at +100/-50%***	***No Failure***
ASTM D 793	***Accelerated Weathering at 5,000 Hours***	***No Cracks, Blisters or Bond Loss***

(1) Sample cured 21 days at 77+-2°F and 50+-5% relative humidity. Proper joint design and preparation are necessary for maximum performance.

605-2.2 Backer rod. The material furnished shall be a compressible, non-shrinking, non-staining, non-absorbing material that is non-reactive with the joint sealant in accordance with ASTM D5249. The backer-rod material shall be 25% ± 5 % larger in diameter than the nominal width of the joint.

605-2.3 Bond breaking tapes. ***The backer rod shall be a non-moisture absorbing, closed cell polyethylene foam rod that is compatible with the seal material to act as a bond breaker. The backer rod shall be compatible with the sealant and no bond or reaction shall occur between the rod and the sealant. The backer rod shall be of sufficient size per the required joint opening to provide a tight seal that prevent sealant from flowing to the bottom of the joint.*** Provide a bond breaking tape or separating material that is a flexible, non-shrinkable, non-absorbing, non-staining, and non-reacting adhesive-backed tape. The material shall have a melting point at least 5°F (3°C) greater than the pouring temperature of the sealant being used when tested in accordance with ASTM D789. The bond breaker tape shall be approximately 1/8 inch (3 mm) wider than the nominal width of the joint and shall not bond to the joint sealant.

CONSTRUCTION METHODS

605-3.1 Time of application. Joints shall be sealed as soon after completion of the curing period as feasible and before the pavement is opened to traffic, including construction equipment. The pavement temperature shall be 50°F (10°C) and rising at the time of application of the poured joint sealing material. Do not apply sealant if moisture is observed in the joint. ***When used with P-606, such as light can installation, P-605 shall not be applied until the P-606 has fully cured.***

605-3.2 Equipment. Machines, tools, and equipment used in the performance of the work required by this section shall be approved before the work is started and maintained in satisfactory condition at all times. ***The Contractor shall*** submit a list of proposed equipment to ***the RPR to be*** used in performance of construction work including descriptive data, **30** days prior to use on the project.

a. Tractor-mounted routing tool. Provide a routing tool, used for removing old sealant from the joints, of such shape and dimensions and so mounted on the tractor that it will not damage the sides of the joints. The tool shall be designed so that it can be adjusted to remove the old material to varying depths as required. The use of V-shaped tools or rotary impact routing devices will not be permitted. Hand-operated spindle routing devices may be used to clean and enlarge random cracks.

b. Concrete saw. ***For newly constructed PCC Pavements only.*** Provide a self-propelled power saw, with water-cooled diamond or abrasive saw blades, for cutting joints to the depths and widths specified.

c. Sandblasting equipment. Sandblasting is not allowed.

d. Waterblasting equipment. The Contractor must demonstrate waterblasting equipment including the pumps, hose, guide and nozzle size, under job conditions, before approval in accordance with paragraph 605-3.3. The Contractor shall demonstrate, in the presence of the RPR, that the method cleans the joint and does not damage the joint.

e. Hand tools. Hand tools may be used, when approved ***by the RPR***, for removing defective sealant from a crack and repairing or cleaning the crack faces. Hand tools should be carefully evaluated for potential spalling effects prior to approval for use.

~~**f. Hot-poured sealing equipment**. The unit applicators used for heating and installing ASTM D6690 joint sealant materials shall be mobile and shall be equipped with a double-boiler, agitator-type kettle with an oil medium in the outer space for heat transfer; a direct-connected pressure-type extruding device with a nozzle shaped for inserting in the joint to be filled; positive temperature devices for controlling the temperature of the transfer oil and sealant; and a recording type thermometer for indicating the temperature of the sealant. The applicator unit shall be designed so that the sealant will circulate through the delivery hose and return to the inner kettle when not in use.~~

g. Cold-applied, single-component sealing equipment. The equipment for installing ASTM D5893 single component joint sealants shall consist of an extrusion pump, air compressor, following plate, hoses, and nozzle for transferring the sealant from the storage container into the joint opening. The dimension of the nozzle shall be such that the tip of the nozzle will extend into the joint to allow sealing from the bottom of the joint to the top. Maintain the initially approved equipment in good working condition, serviced in accordance with the supplier's instructions, and unaltered in any way without obtaining prior approval. Small hand-held air-powered equipment (i.e., caulking guns) may be used for small applications.

605-3.3 Preparation of joints. Pavement joints for application of material in this specification must be dry, clean of all scale, dirt, dust, curing compound, and other foreign matter. The Contractor shall demonstrate, in the presence of the RPR, that the method cleans the joint and does not damage the joint.

a. Sawing. All joints ***for newly installed PCC Pavements*** shall be sawed in accordance with specifications and plan details. Immediately after sawing the joint, the resulting slurry shall be completely removed from joint and adjacent area by flushing with a jet of water, and by use of other tools as necessary.

b. Sealing. Immediately before sealing, the joints shall be thoroughly cleaned of all remaining laitance, curing compound, filler, protrusions of hardened concrete, old sealant and other foreign material from the sides and upper edges of the joint space to be sealed. Cleaning shall be accomplished by ***waterblaster*** as specified in paragraph 605-3.2. The newly exposed concrete joint faces and the pavement surface extending a minimum of 1/2 inch (12 mm) from the joint edge shall be sandblasted clean. ***Waterblasting*** ~~Sandblasting~~ shall be accomplished in a minimum of two passes. One pass per joint face with the nozzle held at an angle directly toward the joint face and not more than 3 inches (75 mm) from it. After final cleaning and immediately prior to sealing, blow out the joints with compressed air and leave them completely free of debris and water. The joint faces shall be surface dry when the seal is applied.

c. Backer Rod. When the joint opening is of a greater depth than indicated for the sealant depth, plug or seal off the lower portion of the joint opening using a backer rod in accordance with paragraph 605-2.2 to prevent the entrance of the sealant below the specified depth. Take care to ensure that the backer rod is placed at the specified depth and is not stretched or twisted during installation.

d. Bond-breaking tape. Where inserts or filler materials contain bitumen, or the depth of the joint opening does not allow for the use of a backup material, insert a bond-separating tape breaker in accordance with paragraph 605-2.3 to prevent incompatibility with the filler materials and three-sided adhesion of the sealant. Securely bond the tape to the bottom of the joint opening so it will not float up into the new sealant.

605-3.4 Installation of sealants. Joints shall be inspected for proper width, depth, alignment, and preparation, and shall be approved by the RPR before sealing is allowed. Sealants shall be installed in accordance with the following requirements:

Silicone Joint Sealants. Joints shall be inspected for proper width, depth, alignment, and preparation, and shall be approved by the RPR before the Contractor begins sealing operations. A backer rod shall be installed as shown on the plans, prior to placement of the joint sealer. The sealant shall be applied in a continuous operation, with an approved mechanical device, and shall adhere to the concrete and be free of voids. The non self-leveling sealant shall then be tooled, with an appropriate tool, to produce a slightly concave surface approximately 1/4 inch below the pavement surface. Tooling shall be accomplished before a skin forms on the surface, usually within ten minutes of application. Tooling is not required for self-leveling sealant.

Immediately preceding, but not more than 50 feet ~~(15 m)~~ ahead of the joint sealing operations, perform a final cleaning with compressed air. Fill the joints from the bottom up to 1/8 inch ±1/16 inch ~~(2 mm)~~ below the top of pavement surface; or bottom of groove for grooved pavement. Remove and discard excess or spilled sealant from the pavement by approved methods. Install the sealant in such a manner as to prevent the formation of voids and entrapped air. In no case shall gravity methods or pouring pots be used to install the sealant material. Traffic shall not be permitted over newly sealed pavement until authorized by the RPR. When a primer is recommended by the manufacturer, apply it evenly to the joint faces in accordance with the manufacturer's instructions. Check the joints frequently to ensure that the newly installed sealant is cured to a tack-free condition within the time specified.

605-3.5 Inspection. The Contractor shall inspect the joint sealant for proper rate of cure and set, bonding to the joint walls, cohesive separation within the sealant, reversion to liquid, entrapped air and voids. Sealants exhibiting any of these deficiencies at any time prior to the final acceptance of the project shall be removed from the joint, wasted, and replaced as specified at no additional cost to the airport.

605-3.6 Clean-up. Upon completion of the project, remove all unused materials from the site and leave the pavement in a clean condition.

605-3.7 JOINT SEALANT LOCATIONS. All joints shall be sealed with the size and type joint shown on the project plans, as given in the project specifications or as directed by the RPR. At any location where two impervious materials are in contact and exposed to the environment, the joint between them is to be sealed. This shall include both "new material to new material" and "new material to old material" locations. All sealant materials and construction shall be approved by the Engineer.

605-3.8 WARRANTY. A representative of the joint sealant manufacturer (for all products used) shall visit the job site a sufficient number of times during the sealing operations and after the sealing is completed to certify that the joint sealant was installed in accordance with the manufacturer's recommended methods and procedures. The Contract shall provide a warranty on the material and installation furnished for a minimum of one (1) year from the date of final acceptance.

605-3.9 ACCEPTANCE CRITERIA

A. The RPR will perform random adhesion hand pull tests for acceptance of joint sealant installation. These tests are performed to detect application problems such as improper cleaning or improper joint configuration and are performed as described below:

- ***Make a knife cut horizontally from one side of the joint to the other,***
- ***Make two vertical cuts (from the horizontal cut) approximately 3 inches long, at both sides of the joint,***
- ***Place a mark 1-inch from the bottom of the 3-inch joint sealant tab,***
- ***Grasp the 2-inch piece of sealant tab beyond the 1-inch marked portion and pull at a 90 degree angle,***
- ***If dissimilar substrates are being sealed, check the adhesion of sealant to each substrate separately.***
- ***This is accomplished by extending the vertical cut along one side and then repeating for the other surface,***
- ***The adhesion test is considered passing when 1-inch of sealant is elongated to 4-inches without bond loss.***

(For illustration of this procedure, refer to the "Installation Guide - DOW Corning Brand Silicone Pavement Sealants") If a joint sealant installation location does not pass the adhesion hand pull test, the Contractor will be required to replace the sealant to the last acceptable adhesion hand pull test. If deemed necessary by the RPR, the RPR will perform additional adhesion hand pull tests to determine the limits of defective work. All tested areas shall be resealed by the Contractor per installation specifications herein at no additional cost to the Owner.

B. The Contractor shall be required to perform test cores on portions of the newly installed joint seals. The Contractor will perform a test core every 1,000 linear feet of joint per crew or as instructed by RPR. Transverse and longitudinal joints in general shall require a 1½ -inch diameter core. The actual core size will be based on the minimum core required to include the portion of the joint between the top edges of the beveled edge to a depth of ½ inch below the backer rod. The expansion joint in general shall require a 2½ inch to a 5 inch core drilled to a depth of at least 2 inches below the backer rod. The actual core size will be based on a minimum core size required to include the portion of joint between the top of the beveled edges. The cores shall be analyzed by the RPR to evaluate the Contractor's adherence to the proper joint sealant shape factors as shown on drawings. If the cores indicate unacceptable shape factors, the Contractor will be required to replace the sealant to the last acceptable core. If deemed necessary by the RPR, additional test cores will be required to determine the limits of defective work.

All cores shall be taken by the Contractor at no cost to the Owner. If the test results indicate satisfactory work is obtained by a crew on a continuous basis, the RPR may reduce the number of cores required from the original frequency of 1,000 linear feet per core for that crew.

The Contractor shall patch the core holes by preparing the core hole in the same manner as for seal placement. A short section of backer rod shall be coiled in the hole prior to sealant placement. After sealant placement the material shall be tooled to ensure bonding to the entire surface. Core patches shall be included in the unit price for joint sealing; no separate payment will be made.

METHOD OF MEASUREMENT

605-4.1 ***No measurement will be made for direct payment of any joint sealants as the cost of the joint sealants shall be considered as subsidiary to the items requiring joint sealants.***

BASIS OF PAYMENT

605-5.1 ***There will be no separate payment for Joint Sealants. All costs shall be incidental to the items requiring joint sealants.***

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM D789	Standard Test Method for Determination of Relative Viscosity of Polyamide (PA)
ASTM D5249	Standard Specification for Backer Material for Use with Cold- and Hot-Applied Joint Sealants in Portland-Cement Concrete and Asphalt Joints
ASTM D5893	Standard Specification for Cold Applied, Single Component, Chemically Curing Silicone Joint Sealant for Portland Cement Concrete Pavements
ASTM D6690	Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt
ASTM D7116	Standard Specification for Joint Sealants, Hot Applied, Jet Fuel Resistant Types for Portland Cement Concrete Pavements

Advisory Circulars (AC)

AC 150/5340-30	Design and Installation Details for Airport Visual Aids

END ITEM P-605

ITEM P-606 ADHESIVE COMPOUNDS, TWO-COMPONENT FOR SEALING WIRE AND LIGHTS IN PAVEMENT

DESCRIPTION

606-1.1 This specification covers two types of material; a liquid suitable for sealing electrical wire in saw cuts in pavement and for sealing light fixtures or bases in pavement, and a paste suitable for embedding light fixtures in the pavement. Both types of material are two-component filled formulas with the characteristics specified in paragraph 606-2.4. Materials supplied for use with asphalt and/or concrete pavements must be formulated so they are compatible with the asphalt and/or concrete.

MATERIALS

606-2.1 Curing. When pre-warmed to 77°F (25°C), mixed, and placed in accordance with manufacturer's directions, the materials shall cure at temperatures of 45°F (7°C) or above without the application of external heat.

606-2.2 Storage. The adhesive components shall not be stored at temperatures over 86°F (30°C), unless otherwise specified by the manufacturer.

606-2.3 Caution. Installation and use shall be in accordance with the manufacturer's recommended procedures. Avoid prolonged or repeated contact with skin. In case of contact, wash with soap and flush with water. If taken internally, call doctor. Keep away from heat or flame. Avoid vapor. Use in well-ventilated areas. Keep in cool place. Keep away from children.

606-2.4 Characteristics. When mixed and cured in accordance with the manufacturer's directions, the materials shall have the following properties shown in Table 1.

Table 1. Property Requirements

Physical or Electrical Property	Minimum	Maximum	ASTM Method
Tensile			
Portland cement concrete	1,000 psi (70 kg/sq cm)		D 638
Asphalt concrete	500 psi (35 kg/sq cm)		
Elongation			
Portland cement concrete		See note [1]	D 638
Asphalt concrete	50%		D 638
Coef. of cub. exp. cu. cm/cu. cm/°C	0.00090	0.00120	D 1168
Coef. of lin. exp. cm/cm/°C	0.000030	0.000040	D 1168
Dielectric strength, short time test	350 volts/mil.		D 149
Arc resistance	125 sec		
Pull-off			
Adhesion to steel	1,000 psi (70 kg/sq cm)		
Adhesion to Portland cement concrete	200 psi (14 kg/sq cm)		
Adhesion to asphalt concrete	No test available.		
Adhesion to aluminum	250 psi		

[1] 20% or more (without filler) for formulations to be supplied for areas subject to freezing.

SAMPLING, INSPECTION, AND TEST PROCEDURES

606-3.1 Tensile properties. Tests for tensile strength and elongation shall be conducted in accordance with ASTM D638.

606-3.2 Expansion. Tests for coefficients of linear and cubical expansion shall be conducted in accordance with, Method B, except that mercury shall be used instead of glycerine. The test specimen shall be mixed in the proportions specified by the manufacturer, and cured in a glass tub approximately 2 inch (50 mm) long by 3/8 inch (9 mm) in diameter. The interior of the tube shall be precoated with a silicone mold release agent. The hardened sample shall be removed from the tube and aged at room temperature for one (1) week before conducting the test. The test temperature range shall be from 35°F (2°C) to 140°F (60°C).

606-3.3 Test for dielectric strength. Test for dielectric strength shall be conducted in accordance with ASTM D149 for sealing compounds to be furnished for sealing electrical wires in pavement.

606-3.4 Test for arc resistance. Test for arc resistance shall be conducted for sealing compounds to be furnished for sealing electrical wires in pavement.

606-3.5 Test for adhesion to steel. The ends of two smooth, clean, steel specimens of convenient size (1 inch by 1 inch by 6 inch) (25 mm by 25 mm by 150 mm) would be satisfactory when bonded together with adhesive mixture and allowed to cure at room temperature for a period of time to meet formulation requirements and then tested to failure on a Riehle (or similar) tensile tester. The thickness of adhesive to be tested shall be 1/4 inch (6 mm).

606-3.6 Adhesion to Portland cement concrete

a. Concrete test block preparation. The aggregate grading shall be as shown in Table 2.

The coarse aggregate shall consist of crushed rock having a minimum of 75% of the particles with at least one fractured face and having a water absorption of not more than 1.5%. The fine aggregate shall consist of crushed sand manufactured from the same parent rock as the coarse aggregate. The concrete shall have a water-cement ratio of 5.5 gallons (21 liters) of water per bag of cement, a cement factor of 6, ±0.5, bags of cement per cubic yard (0.76 cubic meter) of concrete, and a slump of 2-1/2 inch (60 mm), ±1/2 inch (60 mm ±12 mm). The ratio of fine aggregate to total aggregate shall be approximately 40% by solid volume. The air content shall be 5.0%, ±0.5%, and it shall be obtained by the addition to the batch of an air-entraining admixture such as Vinsol® resin. The mold shall be of metal and shall be provided with a metal base plate.

Means shall be provided for securing the base plate to the mold. The assembled mold and base plate shall be watertight and shall be oiled with mineral oil before use. The inside measurement of the mold shall be such that several one inch (25 mm) by 2-inch (75 mm) by 3-inch (25 mm by 50 mm by 75 mm) test blocks can be cut from the specimen with a concrete saw having a diamond blade. The concrete shall be prepared and cured in accordance with ASTM C192.

Table 2. Aggregate For Bond Test Blocks

Type	Sieve Size	Percent Passing
Coarse Aggregate	3/4 inch ~~(19 mm)~~	97 to 100
	1/2 inch ~~(12 mm)~~	63 to 69
	3/8 inch ~~(9 mm)~~	30 to 36
	No. 4 ~~(4.75 mm)~~	0 to 3
Fine Aggregate	No. 4 ~~(4.75 mm)~~	100
	No. 8 ~~(2.36 mm)~~	82 to 88
	No. 16 ~~(1.18 mm)~~	60 to 70
	No. 30 (~~600 µm~~)	40 to 50
	No. 50 ~~(300 µm)~~	16 to 26
	No. 100 (~~150 µm~~)	5 to 9

b. Bond test. Prior to use, oven-dry the test blocks to constant weight at a temperature of 220°F to 230°F (104°C to 110°C), cool to room temperature, 73.4°F ±3°F (23°C ±1.6°C), in a desiccator, and clean the surface of the blocks of film or powder by vigorous brushing with a stiff-bristled fiber brush. Two test blocks shall be bonded together on the one inch by 3 inch (25 mm by 75 mm) sawed face with the adhesive mixture and allowed to cure at room temperature for a period of time to meet formulation requirements and then tested to failure in a Riehle (or similar) tensile tester. The thickness of the adhesive to be tested shall be 1/4 inch (6 mm).

606-3.7 Compatibility with asphalt mix. Test for compatibility with asphalt in accordance with ASTM D5329.

606-3.8 Adhesive compounds - Contractor's responsibility. The Contractor shall furnish the vendor's certified test reports for each batch of material delivered to the project. The report shall certify that the material meets specification requirements and is suitable for use with concrete and/or asphalt concrete pavements. The report shall be provided to and accepted by the Resident Project Representative (RPR) before use of the material. In addition, the Contractor shall obtain a statement from the supplier or manufacturer that guarantees the material for one year. The supplier or manufacturer shall furnish evidence that the material has performed satisfactorily on other projects.

606-3.9 Application. Adhesive shall be applied on a dry, clean surface, free of grease, dust, and other loose particles. The method of mixing and application shall be in strict accordance with the manufacturer's recommendations. When used with Item P-605, such as light can installation, Item P-605 shall not be applied until the Item P-606 has fully cured.

METHOD OF MEASUREMENT

606-4.1 ***No measurement will be made for direct payment of any adhesive compounds as the cost of the adhesive compounds shall be considered as subsidiary to the items requiring adhesive compound.***

BASIS OF PAYMENT

606-5.1 ***There will be no separate payment for Adhesive Compounds. All costs shall be incidental to the items requiring adhesive compounds.***

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM C192	Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory
ASTM D149	Standard Test Method for Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies
ASTM D638	Standard Test Method for Tensile Properties of Plastics
ASTM D5329	Standard Test Methods for Sealants and Fillers, Hot-applied, for Joints and Cracks in Asphaltic and Portland Cement Concrete Pavements

END OF ITEM P-606

ITEM P-610 CONCRETE FOR MISCELLANEOUS STRUCTURES

DESCRIPTION

610-1.1 This item shall consist of concrete and reinforcement, as shown on the plans, prepared and constructed in accordance with these specifications. This specification shall be used for all concrete other than airfield pavement which are cast-in-place.

MATERIALS

610-2.1 General. Only approved materials, conforming to the requirements of these specifications, shall be used in the work. Materials may be subject to inspection and tests at any time during their preparation or use. The source of all materials shall be approved by the Resident Project Representative (RPR) before delivery or use in the work. Representative preliminary samples of the materials shall be submitted by the Contractor, when required, for examination and test. Materials shall be stored and handled to ensure preservation of their quality and fitness for use and shall be located to facilitate prompt inspection. All equipment for handling and transporting materials and concrete must be clean before any material or concrete is placed in them.

The use of pit-run aggregates shall not be permitted unless the pit-run aggregate has been screened and washed, and all fine and coarse aggregates stored separately and kept clean. The mixing of different aggregates from different sources in one storage stockpile or alternating batches of different aggregates shall not be permitted.

a. Reactivity. Fine aggregate and coarse aggregates to be used in all concrete shall have been tested separately within six months of the project in accordance with ASTM C1260. Test results shall be submitted to the RPR. The aggregate shall be considered innocuous if the expansion of test specimens, tested in accordance with ASTM C1260, does not exceed 0.08% at 14 days (16 days from casting). If the expansion either or both test specimen is greater than 0.08% at 14 days, but less than 0.20%, a minimum of 25% of Type F fly ash, or between 40% and 55% of slag cement shall be used in the concrete mix.

If the expansion is greater than 0.20%, the aggregates shall not be used, and test results for other aggregates must be submitted for evaluation; or aggregates that meet P-501 reactivity test requirements may be utilized.

610-2.2 Coarse aggregate. The coarse aggregate for concrete shall meet the requirements of ASTM C33 and the requirements of Table 4, Class Designation 5S; and the grading requirements shown below, as required for the project.

Coarse Aggregate Grading Requirements

Maximum Aggregate Size	ASTM C33, Table 3 Grading Requirements (Size No.)
1 1/2 inch (37.5 mm)	467 or 4 and 67
1 inch (25 mm)	57
¾ inch (19 mm)	67
½ inch (12.5 mm)	7

610-2.2.1 Coarse Aggregate susceptibility to durability (D) cracking. ***Aggregates that have a history of D-cracking shall not be used.***

610-2.3 Fine aggregate. The fine aggregate for concrete shall meet all fine aggregate requirements of ASTM C33.

610-2.4 Cement. Cement shall conform to the requirements of ASTM C150 - Type I

The chemical requirements for all cement types specified should meet suitable criteria for deleterious activity. Low alkali cements (less than 0.6% equivalent alkalies.

Total Alkalies (Na2O and K2O) of the cement secured for the production of concrete shall be independently verified in accordance with ASTM C114 or ASTM C1365.

610-2.5 Cementitious materials.

a. Fly ash. Fly ash shall meet the requirements of ASTM C618, with the exception of loss of ignition, where the maximum shall be less than 6%. Fly ash shall have a Calcium Oxide (CaO) content of less than 13% and a total available alkali content less than 3% per ASTM C311. Fly ash produced in furnace operations using liming materials or soda ash (sodium carbonate) as an additive shall not be acceptable. The Contractor shall furnish the previous three most recent, consecutive ASTM C618 reports for each source of fly ash proposed in the concrete mix, and shall furnish each additional report as they become available during the project. The reports can be used for acceptance or the material may be tested independently by the RPR.

b. Slag cement (ground granulated blast furnace (GGBF)). Slag cement shall conform to ASTM C989, Grade 100 or Grade 120. Slag cement shall be used only at a rate between 25% and 55% of the total cementitious material by mass.

610-2.6 Water. Water used in mixing or curing shall be from potable water sources. Other sources shall be tested in accordance with ASTM C1602 prior to use.

610-2.7 Admixtures. The Contractor shall submit certificates indicating that the material to be furnished meets all of the requirements indicated below. In addition, the RPR may require the Contractor to submit complete test data from an approved laboratory showing that the material to be furnished meets all of the requirements of the cited specifications. Subsequent tests may be made of samples taken by the RPR from the supply of the material being furnished or proposed for use on the work to determine whether the admixture is uniform in quality with that approved.

a. Air-entraining admixtures. Air-entraining admixtures shall meet the requirements of ASTM C260 and shall consistently entrain the air content in the specified ranges under field conditions. The air-entrainment agent and any water reducer admixture shall be compatible.

b. Water-reducing admixtures. Water-reducing admixture shall meet the requirements of ASTM C494, Type A, B, or D. ASTM C494, Type F and G high range water reducing admixtures and ASTM C1017 flowable admixtures shall not be used.

c. Other chemical admixtures. The use of set retarding, and set-accelerating admixtures shall be approved by the RPR. Retarding shall meet the requirements of ASTM C494, Type A, B, or D and set-accelerating shall meet the requirements of ASTM C494, Type C. Calcium chloride and admixtures containing calcium chloride shall not be used.

610-2.8 Premolded joint material. Premolded joint material for expansion joints shall meet the requirements of ASTM **1752.**

610-2.9 Joint filler. The filler for joints shall meet the requirements of Item P-605, unless otherwise specified.

610-2.10 Steel reinforcement. ***Reinforcing shall consist of Grade 60 deformed bars conforming to the requirements of ASTM A615, ASTM A706, ASTM A775 & ASTM A934 and/or welded steel wire fabric conforming to the requirements of ASTM A1064.*** ~~Reinforcing shall consist of **[ ]** conforming to the requirements of **[ ]**.~~

610-2.11 Materials for curing concrete. ***Curing materials shall conform to one or more of the following specifications:*** ~~Curing materials shall conform to **[ ]**.~~

Materials for Curing

Waterproof paper	**ASTM C171**
Clear or white Polyethylene Sheeting	**ASTM C171**
White-pigmented Liquid Membrane-Forming Compound, Type 2, Class B	**ASTM C309**

CONSTRUCTION METHODS

610-3.1 General. The Contractor shall furnish all labor, materials, and services necessary for, and incidental to, the completion of all work as shown on the drawings and specified here. All machinery and equipment used by the Contractor on the work, shall be of sufficient size to meet the requirements of the work. All work shall be subject to the inspection and approval of the RPR.

610-3.2 Concrete Mixture. The concrete shall develop a compressive strength of 4000 psi in 28 days as determined by test cylinders made in accordance with ASTM C31 and tested in accordance with ASTM C39. The concrete shall contain not less than 470 pounds of cementitious material per cubic yard ~~(280 kg per cubic meter)~~. The water cementitious ratio shall not exceed 0.45 by weight. The air content of the concrete shall be 5% +/- 1.2% as determined by ASTM C231 and shall have a slump of not more than 4 inches (100 mm) as determined by ASTM C143.

Concrete produced by a reputable local supplier of ready-mix or transit mix concrete designed for a minimum compressive strength of 4,000 psi or as given in the project

plans, may be used when approved by the Engineer. The Contractor shall submit the ready mix or transit mix design to the Engineer at least 30-days prior to use of concrete on the project.

610-3.3 Mixing. Concrete may be mixed at the construction site, at a central point, or wholly or in part in truck mixers. The concrete shall be mixed and delivered in accordance with the requirements of ASTM C94 or ASTM C685.

The concrete shall be mixed only in quantities required for immediate use. Concrete shall not be mixed while the air temperature is below 40°F (4°C) without the RPRs approval. If approval is granted for mixing under such conditions, aggregates or water, or both, shall be heated and the concrete shall be placed at a temperature not less than 50°F (10°C) nor more than 100°F (38°C). The Contractor shall be held responsible for any defective work, resulting from freezing or injury in any manner during placing and curing, and shall replace such work at his expense.

Retempering of concrete by adding water or any other material is not permitted.

The rate of delivery of concrete to the job shall be sufficient to allow uninterrupted placement of the concrete.

610-3.4 Forms. Concrete shall not be placed until all the forms and reinforcements have been inspected and approved by the RPR. Forms shall be of suitable material and shall be of the type, size, shape, quality, and strength to build the structure as shown on the plans. The forms shall be true to line and grade and shall be mortar-tight and sufficiently rigid to prevent displacement and sagging between supports. The surfaces of forms shall be smooth and free from irregularities, dents, sags, and holes. The Contractor shall be responsible for their adequacy.

The internal form ties shall be arranged so no metal will show in the concrete surface or discolor the surface when exposed to weathering when the forms are removed. All forms shall be wetted with water or with a non-staining mineral oil, which shall be applied immediately before the concrete is placed. Forms shall be constructed so they can be removed without injuring the concrete or concrete surface.

610-3.5 Placing reinforcement. All reinforcement shall be accurately placed, as shown on the plans, and shall be firmly held in position during concrete placement. Bars shall be fastened together at intersections. The reinforcement shall be supported by approved metal chairs. Shop drawings, lists, and bending details shall be supplied by the Contractor when required.

610-3.6 Embedded items. Before placing concrete, all embedded items shall be firmly and securely fastened in place as indicated. All embedded items shall be clean and free from coating, rust, scale, oil, or any foreign matter. The concrete shall be spaded and consolidated around and against embedded items. The embedding of wood shall not be allowed.

610-3.7 Concrete Consistency. The Contractor shall monitor the consistency of the concrete delivered to the project site; collect each batch ticket; check temperature; and perform slump tests on each truck at the project site in accordance with ASTM C143.

610-3.8 Placing concrete. All concrete shall be placed during daylight hours, unless otherwise approved. The concrete shall not be placed until the depth and condition of foundations, the adequacy of forms and falsework, and the placing of the steel reinforcing have been approved

by the RPR. Concrete shall be placed as soon as practical after mixing, but in no case later than one (1) hour after water has been added to the mix. The method and manner of placing shall avoid segregation and displacement of the reinforcement. Troughs, pipes, and chutes shall be used as an aid in placing concrete when necessary. The concrete shall not be dropped from a height of more than 5 feet (1.5 m). Concrete shall be deposited as nearly as practical in its final position to avoid segregation due to rehandling or flowing. Do not subject concrete to procedures which cause segregation. Concrete shall be placed on clean, damp surfaces, free from running water, or on a properly consolidated soil foundation.

610-3.9 Vibration. Vibration shall follow the guidelines in American Concrete Institute (ACI) Committee 309R, Guide for Consolidation of Concrete.

610-3.10 Joints. Joints shall be constructed as indicated on the plans.

610-3.11 Finishing. All exposed concrete surfaces shall be true, smooth, and free from open or rough areas, depressions, or projections. All concrete horizontal plane surfaces shall be brought flush to the proper elevation with the finished top surface struck-off with a straightedge and floated.

610-3.12 Curing and protection. All concrete shall be properly cured in accordance with the recommendations in American Concrete Institute (ACI) 308R, Guide to External Curing of Concrete. The concrete shall be protected from damage until project acceptance.

610-3.13 Cold weather placing. When concrete is placed at temperatures below 40°F (4°C), follow the cold weather concreting recommendations found in ACI 306R, Cold Weather Concreting.

610-3.14 Hot weather placing. When concrete is placed in hot weather greater than 85ºF (30 ºC), follow the hot weather concreting recommendations found in ACI 305R, Hot Weather Concreting.

QUALITY ASSURANCE (QA)

610-4.1 Quality Assurance sampling and testing. Concrete for each day's placement will be accepted on the basis of the compressive strength specified in paragraph 610-3.2. The ***Contractor*** ~~RPR~~ will sample the concrete in accordance with ASTM C172; test the slump in accordance with ASTM C143; test air content in accordance with ASTM C231; make and cure compressive strength specimens in accordance with ASTM C31; and test in accordance with ASTM C39. The QA testing agency will meet the requirements of ASTM C1077.

The Contractor shall prepare six test specimens for each day's pour. The Contractor shall provide adequate facilities for the initial curing of cylinders. ***The Contractor shall retain thee specimens for quality control (QC) testing and deliver to the QA laboratory three specimens. QC and QA testing of the specimens shall occur at 3 days, 7 days and 28 days.***

610-4.2 Defective work. Any defective work that cannot be satisfactorily repaired as determined by the RPR, shall be removed and replaced at the Contractor's expense. Defective work includes, but is not limited to, uneven dimensions, honeycombing and other voids on the surface or edges of the concrete.

METHOD OF MEASUREMENT

610-5.1 ***There shall be no separate measurement of the quantity of reinforced or unreinforced Concrete for Miscellaneous Structures used in the construction.***

BASIS OF PAYMENT

610-6.1 ~~This price shall be full compensation for furnishing all materials including reinforcement and embedded items and for all preparation, delivery, installation, and curing of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.~~ ***There shall be no separate payment for the Concrete for Miscellaneous Structures, all costs including furnishing all materials including reinforcement and embedded items and for all preparation, delivery, installation, and curing of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item shall be incidental to the items requiring Concrete for Miscellaneous Structures.***

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM A184	Standard Specification for Welded Deformed Steel Bar Mats for Concrete Reinforcement
ASTM A615	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A704	Standard Specification for Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement
ASTM A706	Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
ASTM A775	Standard Specification for Epoxy-Coated Steel Reinforcing Bars
ASTM A884	Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement
ASTM A934	Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars
ASTM A1064	Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
ASTM C31	Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C33	Standard Specification for Concrete Aggregates
ASTM C39	Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C94	Standard Specification for Ready-Mixed Concrete
ASTM C136	Standard Test Method for Sieve or Screen Analysis of Fine and Coarse Aggregates

ASTM C114	Standard Test Methods for Chemical Analysis of Hydraulic Cement
ASTM C136	Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C143	Standard Test Method for Slump of Hydraulic-Cement Concrete
ASTM C150	Standard Specification for Portland Cement
ASTM C171	Standard Specification for Sheet Materials for Curing Concrete
ASTM C172	Standard Practice for Sampling Freshly Mixed Concrete
ASTM C231	Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C260	Standard Specification for Air-Entraining Admixtures for Concrete
ASTM C309	Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C311	Standard Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use in Portland-Cement Concrete
ASTM C494	Standard Specification for Chemical Admixtures for Concrete
ASTM C618	Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM C666	Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing
ASTM C685	Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing
ASTM C989	Standard Specification for Slag Cement for Use in Concrete and Mortars
ASTM C1017	Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete
ASTM C1077	Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
ASTM C1157	Standard Performance Specification for Hydraulic Cement
ASTM C1260	Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
ASTM C1365	Standard Test Method for Determination of the Proportion of Phases in Portland Cement and Portland-Cement Clinker Using X-Ray Powder Diffraction Analysis
ASTM C1602	Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete
ASTM D1751	Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Asphalt Types)

ASTM D1752	Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction

American Concrete Institute (ACI)

ACI 305R	Hot Weather Concreting
ACI 306R	Cold Weather Concreting
ACI 308R	Guide to External Curing of Concrete
ACI 309R	Guide for Consolidation of Concrete

END OF ITEM P-610

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ITEM P-620 RUNWAY AND TAXIWAY MARKING

DESCRIPTION

620-1.1 This item shall consist of the preparation and painting of numbers, markings, and stripes on the surface of runways, taxiways, and aprons, in accordance with these specifications and at the locations shown on the plans, or as directed by the Resident Project Representative (RPR). The terms "paint" and "marking material" as well as "painting" and "application of markings" are interchangeable throughout this specification. ***Where applicable, The Contractor comply with best practices as published by the Innovative Pavement Research Foundation Report 01-G-002-05-1 title Airfield Markings Handbook, September 2008 unless otherwise approved by the Engineer.***

MATERIALS

620-2.1 Materials acceptance. The Contractor shall furnish manufacturer's certified test reports, for materials shipped to the project. The certified test reports shall include a statement that the materials meet the specification requirements. This certification along with a copy of the paint manufacturer's surface preparation; marking materials, including adhesion, flow promoting and/or floatation additive; and application requirements must be submitted and approved by the Resident Project Representative (RPR) prior to the initial application of markings. The reports can be used for material acceptance or the RPR may perform verification testing. The reports shall not be interpreted as a basis for payment. The Contractor shall notify the RPR upon arrival of a shipment of materials to the site. All material shall arrive in sealed containers that are easily quantifiable for inspection by the RPR.

620-2.2 Marking materials.

Table 1. Marking Materials

Paint[1]				Glass Beads[2]	
Type	**Color**	**Fed Std. 595 Number**	**Application Rate Maximum**	**Type**	**Application Rate Minimum**
II	White (Final)	**37925**	115 ft^2/gal	III	10 lb/gal
II	White (Temp)	**37925**	57.5 ft^2/gal	I	7 lb/gal
II	Red (Final)	**31136**	115 ft^2/gal	I	5 lb/gal
II	Red (Temp)	**31136**	57.5 ft^2/gal	-	-
II	Yellow (Final)	**33538 or 33655**	115 ft^2/gal	III	10 lb/gal
II	Yellow (Temp)	**33538 or 33655**	57.5 ft^2/gal	I	7 lb/gal
II	Black	**37038**	115 ft^2/gal	-	-

[1] See paragraph 620-2.2a

[2] See paragraph 620-2.2b

a. Paint. Paint shall be waterborne in accordance with the requirements of this paragraph. Paint colors shall comply with Federal Standard No. 595.

Black outlining is required for this project unless shown otherwise by the Project Plans.

Waterborne. Paint shall meet the requirements of Federal Specification TT-P-1952F, Type II. The non-volatile portion of the vehicle for all paint types shall be composed of a 100% acrylic polymer as determined by infrared spectral analysis.

b. Reflective media. Glass beads for ***all permanent*** white and yellow paint shall meet the requirements for Federal Specification TT-B-1325D Type III, Gradation A. Glass beads for permanent red and pink paint shall meet the requirements for Type I, Gradation A, ***except for zipper markings, which shall receive Type III glass beads. Glass beads for temporary white and yellow paint shall meet the requirements of Federal Specification TT-B-1325D Type I, Gradation A.***

Glass beads shall be treated with all compatible coupling agents recommended by the manufacturers of the paint and reflective media to ensure adhesion and embedment.

Glass beads shall not be used in black and green paint.

Type III glass beads shall not be used in red and pink paint.

620-2.3 Biocide Additive. A biocide additive will be required to be included at the time of manufacture that resists algae growth on the coating. Biocide shall meet or exceed that of Safety Coatings of Foley, Alabama. The Contractor shall submit biocide data to the Engineer for prior approval. Mixing concentrations shall be in accordance with the paint manufacturer's recommendations and shall not, in any way, diminish the warranty of the paint.

CONSTRUCTION METHODS

620-3.1 Weather limitations. Painting shall only be performed when the surface is dry, and the ambient temperature and the pavement surface temperature meet the manufacturer's recommendations in accordance with paragraph 620-2.1. Painting operations shall be discontinued when the ambient or surface temperatures does not meet the manufacturer's recommendations. Markings shall not be applied when the wind speed exceeds 10 mph unless windscreens are used to shroud the material guns. Markings shall not be applied when weather conditions are forecasts to not be within the manufacturers' recommendations for application and dry time.

620-3.2 Equipment. Equipment shall include the apparatus necessary to properly clean the existing surface, a mechanical marking machine, a bead dispensing machine, and such auxiliary hand-painting equipment as may be necessary to satisfactorily complete the job.

The mechanical marker shall be an atomizing spray-type or airless type marking machine with automatic glass bead dispensers suitable for application of traffic paint. It shall produce an even and uniform film thickness and appearance of both paint and glass beads at the required coverage and shall ***be designed so as to*** apply markings of uniform cross-sections and clear-cut edges without running or spattering ~~and without over spray.~~ ***within the limits for***

straightness set forth herein. Refer to paragraph 620-3.5 for application. The marking equipment for both paint and beads shall be calibrated daily.

Suitable adjustments shall be provided on the sprayer(s) of a single machine or by furnishing additional equipment for painting the width required.

The Contractor shall provide the necessary airfield stencils that have been approved by the Owner to paint the surface painted signs and taxiway location signs as indicated in the plans.

620-3.3 Preparation of surfaces. Immediately before application of the paint, the surface shall be dry and free from dirt, grease, oil, laitance, or other contaminates that would reduce the bond between the paint and the pavement. Use of any chemicals or impact abrasives during surface preparation shall be approved in advance by the RPR. After the cleaning operations, sweeping, blowing, or rinsing with pressurized water shall be performed to ensure the surface is clean and free of grit or other debris left from the cleaning process.

a. Preparation of new pavement surfaces. ***Extreme care shall be taken not to damage the pavement.*** The area to be painted shall be cleaned by broom, blower, ~~water blasting~~, or by other methods approved by the RPR to remove all contaminants, including PCC curing compounds, minimizing damage to the pavement surface.

b. Preparation of pavement to remove existing markings. Existing pavement markings shall be removed by rotary grinding, ~~water blasting~~, or by other methods approved by the RPR minimizing damage to the pavement surface. The removal area may need to be larger than the area of the markings to eliminate ghost markings. After removal of markings on asphalt pavements, apply a fog seal or seal coat to 'block out' the removal area to eliminate 'ghost' markings. ***Coatings will be incidental to this work.***

c. Preparation of pavement markings prior to remarking. Prior to remarking existing markings, loose existing markings must be removed minimizing damage to the pavement surface, with a method approved by the RPR. After removal, the surface shall be cleaned of all residue or debris.

Prior to the application of markings, the Contractor shall certify in writing that the surface is dry and free from dirt, grease, oil, laitance, or other foreign material that would prevent the bond of the paint to the pavement or existing markings. This certification along with a copy of the paint manufactures application and surface preparation requirements must be submitted to the RPR prior to the initial application of markings.

Markings to be removed and repainted shall be dry and free from dirt, grease, oil, laitance, or other foreign material that would reduce the bond between the new paint and the existing paint. The areas to be painted shall be cleaned by pressure washing or by other methods approved by the Engineer, as required to remove all dirt, laitance, and loose materials.

Prior to each working day, the Contractor shall calibrate the application equipment and provide evidence of that calibration to the RPR. Twice daily, or as directed by the RPR, the Contractor shall test the day's production for thickness and reflectivity. All testing results shall be provided to the RPR/Engineer at the end of each day's production.

620-3.4 Layout of markings. The proposed markings shall be laid out ***by the Contractor with a licensed land surveyor registered in the state of Florida*** in advance of the paint application. ***The Contractor shall provide an experienced technician to supervise the***

location, alignment, layout, dimensions, and application of the paint. Prior to the markings being laid out in the field, the Contractor and marking Subcontractor shall attend a pre-activity meeting with the Airport, RPR and Engineer. The locations of markings to receive glass beads shall be shown on the plans.

620-3.5 Application. A period of **30** days shall elapse between placement of surface course or seal coat and application of the permanent paint markings. Paint shall be applied at the locations and to the dimensions and spacing shown on the plans. Paint shall not be applied until the layout ***has been performed by a licensed surveyor*** and ***the*** condition of the surface has been approved by the RPR.

The edges of the markings shall not vary from a straight line more than 1/2 inch (12 mm) in 50 feet (15 m), and marking dimensions and spacing shall be within the following tolerances:

Marking Dimensions and Spacing Tolerance

Dimension and Spacing	Tolerance
36 inch (910 mm) or less	±1/2 inch (12 mm)
greater than 36 inch to 6 feet (910 mm to 1.85 m)	±1 inch (25 mm)
greater than 6 feet to 60 feet (1.85 m to 18.3 m)	±2 inch (50 mm)
greater than 60 feet (18.3 m)	±3 inch (76 mm)

The paint shall be mixed in accordance with the manufacturer's instructions and applied to the pavement with a marking machine at the rate shown in Table 1. The addition of thinner will not be permitted. ***Subject to the overall scheduling requirements, the Contractor shall allow the maximum time to elapse after paving to allow the asphalt to oxidize prior to any permanent painting.***

Glass beads shall be distributed upon the marked areas at the locations shown on the plans to receive glass beads immediately after application of the paint. A dispenser shall be furnished that is properly designed for attachment to the marking machine and suitable for dispensing glass beads. Glass beads shall be applied at the rate shown in Table 1. Glass beads shall not be applied to black paint or green paint. Glass beads shall adhere to the cured paint or all marking operations shall cease until corrections are made. Different bead types shall not be mixed. Regular monitoring of glass bead embedment and distribution should be performed.

A layer (one coat) of temporary paint, with glass beads as noted in Table 1, shall be applied twenty-four (24) hours after placement of bituminous pavements to allow the prompt re-opening of pavements to aircraft traffic. However, the paint shall not bleed, curl, or discolor when applied. A permanent layer of paint with glass beads shall be applied at the end of the project on top of the temporary markings layer. Black outline shall not be applied for temporary paint.

620-3.6 Application--preformed thermoplastic airport pavement markings. Preformed thermoplastic pavement markings not used.

620-3.7 Control strip. Prior to the full application of airfield markings, the Contractor shall prepare a control strip in the presence of the RPR. The Contractor shall demonstrate the surface preparation method and all striping equipment to be used on the project. The marking equipment must achieve the prescribed application rate of paint and population of glass beads

(per Table 1) that are properly embedded and evenly distributed across the full width of the marking. Prior to acceptance of the control strip, markings must be evaluated during darkness to ensure a uniform appearance. ***Thickness shall be in the range of 12-18 mil and reflectivity measurement shall comply with paragraph 620-2.2***

620-3.8 Retro-reflectance. Reflectance shall be measured with a portable retro-reflectometer meeting ASTM E1710 (or equivalent). A total of 6 reading shall be taken over a 6 square foot area with 3 readings taken from each direction. The average shall be equal to or above the minimum levels of all readings which are within 30% of each other.

Minimum Retro-Reflectance Values

Material	Retro-reflectance mcd/m^2/lux		
	White	**Yellow**	**Red**
Initial Type I	300	175	35
Initial Type III	600	300	35
~~Initial Thermoplastic~~	~~225~~	~~100~~	~~35~~
All materials, remark when less than[1]	100	75	10

[1] 'Prior to remarking determine if removal of contaminants on markings will restore retro-reflectance

620-3.9 Protection and cleanup. After application of the markings, all markings shall be protected from damage until dry. All surfaces shall be protected from excess moisture and/or rain and from disfiguration by spatter, splashes, spillage, or drippings. The Contractor shall remove from the work area all debris, waste, loose reflective media, and by-products generated by the surface preparation and application operations to the satisfaction of the RPR. The Contractor shall dispose of these wastes in strict compliance with all applicable state, local, and federal environmental statutes and regulations. ***Any excess paint outside the limits of markings, including splatters, splashes, spillage, or drippings of paint shall be removed through grinding. Any existing markings to remain that are damaged from Contractor's operations shall be re-painted at the Contractor's expense.***

620-3.10 Stencils. In advance of any marking operations, the Contractor shall submit for review by the Engineer the stencils to be employed for the installation of surface painted signs.

620-3.11 Surfaces to receive new markings. The Contractor shall not apply new markings over newly applied paint. For example, black borders shall not be applied the full width of the marking, then apply yellow markings to achieve black border requirements.

620-3.12 As-Built Survey. At the completion of each work area, the Contractor shall provide as-built evidence prepared by a State of Florida licensed land surveyor demonstrating that newly installed markings comply with the dimensions provided in the Contact Documents. Additionally, the Contractor shall produce testing results for applied thickness and reflectivity. No payment to the Contractor shall be made until such documentation is produced and provided to the Engineer for approval newly installed

markings that do not satisfy the required dimensions, thickness or reflectivity shall be removed and reinstalled by the Contractor. Such removal and reinstallation shall be at the expense of the Contractor.

METHOD OF MEASUREMENT

620-4.1 The quantity of runway and taxiway markings to be paid for shall be the number of square feet of painting including reflective media performed and installed in accordance with the specifications and accepted by the RPR. The quantity of runway and taxiway paint removal shall be paid for by the number of square feet removed and accepted by the RPR. Measurement of markings removed and installed shall occur in the presence of both the Contractor and RPR.

BASIS OF PAYMENT

620-5.1 Payment shall be made at the respective contract price per square foot for runway and taxiway painting. Payment shall be made at the respective contract price per square feet for runway and taxiway paint removal. This price shall be full compensation for furnishing all materials and for all labor, equipment, tools, reflective media, testing, layout, surface cleaning and incidentals necessary to complete the item.

Payment will be made under:

Item P-620-5.1	Permanent Airfield Painting with Type III Glass Beads (Yellow, White) - per Square Foot
Item P-620-5.2	Permanent Airfield Painting with Type I Glass Beads (Red Surface Painted Signs) – per Square Foot
Item P-620-5.3	Permanent Airfield Painting with No Glass Beads (Black) – per Square Foot
Item P-620-5.4	Temporary Airfield Painting with Type I Glass Beads (Yellow and White) – per Square Foot
Item P-620-5.5	Temporary Airfield Painting with No Glass Beads (Red Surface Painted Signs) – per Square Foot
Item P-620-5.6	Airfield Paint Removal – per Square Foot

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM D476	Standard Classification for Dry Pigmentary Titanium Dioxide Products
ASTM D968	Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive
ASTM D1652	Standard Test Method for Epoxy Content of Epoxy Resins
ASTM D2074	Standard Test Method for Total, Primary, Secondary, and Tertiary Amine Values of Fatty Amines by Alternative Indicator Method
ASTM D2240	Standard Test Method for Rubber Property - Durometer Hardness
ASTM D7585	Standard Practice for Evaluating Retroreflective Pavement Markings Using Portable Hand-Operated Instruments
ASTM E303	Standard Test Method for Measuring Surface Frictional Properties Using the British Pendulum Tester
ASTM E1710	Standard Test Method for Measurement of Retroreflective Pavement Marking Materials with CEN-Prescribed Geometry Using a Portable Retroreflectometer
ASTM E2302	Standard Test Method for Measurement of the Luminance Coefficient Under Diffuse Illumination of Pavement Marking Materials Using a Portable Reflectometer
ASTM G154	Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials

Code of Federal Regulations (CFR)

40 CFR Part 60, Appendix A-7, Method 24
Determination of volatile matter content, water content, density, volume solids, and weight solids of surface coatings

29 CFR Part 1910.1200 Hazard Communication

Federal Specifications (FED SPEC)

FED SPEC TT-B-1325D	Beads (Glass Spheres) Retro-Reflective
FED SPEC TT-P-1952F	Paint, Traffic and Airfield Marking, Waterborne
FED STD 595	Colors used in Government Procurement

Commercial Item Description

A-A-2886B Paint, Traffic, Solvent Based

Advisory Circulars (AC)

AC 150/5340-1 Standards for Airport Markings

AC 150/5320-12 Measurement, Construction, and Maintenance of Skid Resistant Airport Pavement Surfaces

END OF ITEM P-620

ITEM T-904 SODDING

DESCRIPTION

904-1.1 This item shall consist of furnishing, hauling, and placing approved live sod on prepared areas in accordance with this specification at the locations shown on the plans or as directed by the RPR. ***Any haul routes or other disturbances by the Contractor will be repaired at the Contractor's expense.***

MATERIALS

904-2.1 Sod. Sod furnished by the Contractor shall have a good cover of living or growing grass. This shall be interpreted to include grass that is seasonally dormant during the cold or dry seasons and capable of renewing growth after the dormant period. All sod shall be obtained from areas where the soil is reasonably fertile and contains a high percentage of loamy topsoil. Sod shall be cut or stripped from living, thickly matted turf relatively free of weeds or other undesirable foreign plants, large stones, roots, or other materials that might be detrimental to the development of the sod or to future maintenance. At least 70% of the plants in the cut sod shall be composed of the species stated in the special provisions, and any vegetation more than 6 inches (150 mm) in height shall be mowed to a height of 3 inches (75 mm) or less before sod is lifted. Sod, including the soil containing the roots and the plant growth showing above, shall be cut uniformly to a thickness not less than ***2" include ¾" thick layer of roots with soil.*** ~~that stated in the special provisions.~~

904-2.2 Lime. Lime shall be ground limestone containing not less than 85% of total carbonates, and shall be ground to such fineness that 90% will pass through a No. 20 (850 µm) mesh sieve and 50% will pass through a No. 100 (150 µm) mesh sieve. Coarser material will be acceptable, providing the rates of application are increased to provide not less than the minimum quantities and depth specified in the special provisions on the basis of the two sieve requirements above. Dolomitic lime or a high magnesium lime shall contain at least 10% of magnesium oxide. Lime shall be applied at the rate of 500 lbs/acre. All liming materials shall conform to the requirements of ASTM C602.

904-2.3 Fertilizer. Fertilizer shall be standard commercial fertilizers supplied separately or in mixtures containing the percentages of total nitrogen, available phosphoric acid, and water-soluble potash. They shall be applied at the rate and to the depth specified, and shall meet the requirements of ***Federal Spec A-A-1909 and*** applicable state laws. They shall be furnished in standard containers with name, weight, and guaranteed analysis of contents clearly marked thereon. No cyanamide compounds or hydrated lime shall be permitted in mixed fertilizers.

The fertilizers may be supplied in one of the following forms:

a. A dry, free-flowing fertilizer suitable for application by a common fertilizer spreader;

b. A finely-ground fertilizer soluble in water, suitable for application by power sprayers; or

c. A granular or pellet form suitable for application by blower equipment.

Fertilizers shall be **10-10-10** commercial fertilizer and shall be spread at the rate of **500 lbs/acre.**

904-2.4 Water. The water shall be sufficiently free from oil, acid, alkali, salt, or other harmful materials that would inhibit the growth of grass.

904-2.5 Soil for repairs. The soil for fill and topsoiling of areas to be repaired shall be at least of equal quality to that which exists in areas adjacent to the area to be repaired. The soil shall be relatively free from large stones, roots, stumps, or other materials that will interfere with subsequent sowing of seed, compacting, and establishing turf, and shall be approved by the RPR before being placed.

CONSTRUCTION METHODS

904-3.1 General. Areas to be solid, strip, or spot sodded shall be shown on the plans. Areas requiring special ground surface preparation such as tilling and those areas in a satisfactory condition that are to remain undisturbed shall also be shown on the plans.

Suitable equipment necessary for proper preparation of the ground surface and for the handling and placing of all required materials shall be on hand, in good condition, and shall be approved by the RPR before the various operations are started. The Contractor shall demonstrate to the RPR before starting the various operations that the application of required materials will be made at the specified rates.

904-3.2 Preparing the ground surface. After grading of areas has been completed and before applying fertilizer and limestone, areas to be sodded shall be raked or otherwise cleared of stones larger than 2 inches (50 mm) in any diameter, sticks, stumps, and other debris which might interfere with sodding, growth of grasses, or subsequent maintenance of grass-covered areas. If any damage by erosion or other causes occurs after grading of areas and before beginning the application of fertilizer and ground limestone, the Contractor shall repair such damage. This may include filling gullies, smoothing irregularities, and repairing other incidental damage.

In areas where sod is specified to be placed against existing pavements, the Contractor shall shape the receiving ground surface to achieve a 1-1/2" drop-off from the existing pavement edge to the top of the sod mat. Sod mat is assumed to be 2 inches thick. No separate payment shall be made for the reshaping of the receiving surface. All work associated with the reshaping of the receiving surface to achieve the 1-1/2" drop-off is considered incidental to item T-904-1.

904-3.3 Applying fertilizer and ground limestone. Following ground surface preparation, fertilizer shall be uniformly spread at a rate which will provide not less than the minimum quantity of each fertilizer ingredient, as stated in the special provisions. If use of ground limestone is required, it shall then be spread at a rate that will provide not less than the minimum quantity stated in the special provisions. These materials shall be incorporated into the soil to a depth of not less than 2 inches (50 mm) by discing, raking, or other suitable methods. Any stones larger than 2 inches (50 mm) in any diameter, large clods, roots, and other litter brought to the surface by this operation shall be removed.

904-3.4 Obtaining and delivering sod. After inspection and approval of the source of sod by the RPR, the sod shall be cut with approved sod cutters to such a thickness that after it has

been transported and placed on the prepared bed, but before it has been compacted, it shall have a uniform thickness of not less than 2 inches (50 mm). Sod sections or strips shall be cut in uniform widths, not less than 10 inches (250 mm), and in lengths of not less than 18 inches (0.5 m), but of such length as may be readily lifted without breaking, tearing, or loss of soil. Where strips are required, the sod must be rolled without damage with the grass folded inside. The Contractor may be required to mow high grass before cutting sod.

The sod shall be transplanted within 24 hours from the time it is stripped, unless circumstances beyond the Contractor's control make storing necessary. In such cases, sod shall be stacked, kept moist, and protected from exposure to the air and sun and shall be kept from freezing. Sod shall be cut and moved only when the soil moisture conditions are such that favorable results can be expected. Where the soil is too dry, approval to cut sod may be granted only after it has been watered sufficiently to moisten the soil to the depth the sod is to be cut.

904-3.5 Laying sod. Sodding shall be performed only during the seasons when satisfactory results can be expected. Frozen sod shall not be used and sod shall not be placed upon frozen soil. Sod may be transplanted during periods of drought with the approval of the RPR, provided the sod bed is watered to moisten the soil to a depth of at least 4 inches (100 mm) immediately prior to laying the sod.

The sod shall be moist and shall be placed on a moist earth bed. Pitch forks shall not be used to handle sod, and dumping from vehicles shall not be permitted. The sod shall be carefully placed by hand, edge to edge and with staggered joints, in rows at right angles to the slopes, commencing at the base of the area to be sodded and working upward. The sod shall immediately be pressed firmly into contact with the sod bed by tamping or rolling with approved equipment to provide a true and even surface, and ensure knitting without displacement of the sod or deformation of the surfaces of sodded areas. Where the sod may be displaced during sodding operations, the workmen, when replacing it, shall work from ladders or treaded planks to prevent further displacement. Screened soil of good quality shall be used to fill all cracks between sods. The quantity of the fill soil shall not cause smothering of the grass. Where the grades are such that the flow of water will be from paved surfaces across sodded areas, the surface of the soil in the sod after compaction shall be set approximately one inch (25 mm) below the pavement edge. Where the flow will be over the sodded areas and onto the paved surfaces around manholes and inlets, the surface of the soil in the sod after compaction shall be placed flush with pavement edges.

On slopes steeper than one (1) vertical to 2-1/2 horizontal and in v-shaped or flat-bottom ditches or gutters, the sod shall be pegged with wooden pegs not less than 12 inches (300 mm) in length and have a cross-sectional area of not less than 3/4 sq inch (18 sq mm). The pegs shall be driven flush with the surface of the sod.

904-3.6 Watering. Adequate water and watering equipment must be on hand before sodding begins, and sod shall be kept moist until it has become established and its continued growth assured. In all cases, watering shall be done in a manner that will avoid erosion from the application of excessive quantities and will avoid damage to the finished surface. ***The Contractor will be required to water sodded areas a minimum of three (3) times per week until sod is well established as determined by the RPR. All cost for watering, including supplying the water, shall be included in the unit bid price for the sod. Depending on weather conditions, the need for watering may be waived by the RPR.***

904-3.7 Establishing turf. The Contractor shall provide general care for the sodded areas as soon as the sod has been laid and shall continue until final inspection and acceptance of the work. All sodded areas shall be protected against traffic or other use by warning signs or barricades approved by the RPR. The Contractor shall mow the sodded areas with approved mowing equipment, depending upon climatic and growth conditions and the needs for mowing specific areas. Weeds or other undesirable vegetation shall be mowed and the clippings raked and removed from the area.

904-3.8 Repairing. When the surface has become gullied or otherwise damaged during the period covered by this contract, the affected areas shall be repaired to re-establish the grade and the condition of the soil, as directed by the RPR, and shall then be sodded as specified in paragraph 904-3.5.

904-3.9 ELEVATION OF SOD. The top elevation of the sod when placed next to new or existing asphalt or concrete pavement shall have a 1-1/2" drop from the pavement edge. When sod is placed adjacent to new or existing concrete sign bases, light can bases, junction cans, manholes, other concrete slabs, etc., the drop shall be from zero to 1" maximum. When sod is placed around new or existing inlets or other drainage structures, sod is to be flush with the concrete of the structure, so drainage flow is not blocked. The top of the sod mat is assumed to be the top of the root mass.

METHOD OF MEASUREMENT

904-4.1 This item shall be measured on the basis of the area in square yards ~~(square meters)~~ of the surface covered with sod and accepted.

BASIS OF PAYMENT

904-5.1 This item will be paid for on the basis of the contract unit price per square yard ~~(square meter)~~ for sodding, which price shall be full compensation for all labor, equipment, material, staking, and incidentals necessary to satisfactorily complete the items as specified.

Payment will be made under:

Item T-904-5.1 Sodding - per square yard ~~(square meter)~~

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM C602 Standard Specification for Agricultural Liming Materials

Advisory Circulars (AC)

AC 150/5200-33 Hazardous Wildlife Attractants on or Near Airports

FAA/United States Department of Agriculture

Wildlife Hazard Management at Airports, A Manual for Airport Personnel

END OF ITEM T-904

ITEM T-905 TOPSOIL

DESCRIPTION

905-1.1 This item shall consist of preparing the ground surface for topsoil application, removing topsoil from designated stockpiles or areas to be stripped on the site or from approved sources off the site, and placing and spreading the topsoil on prepared areas in accordance with this specification at the locations shown on the plans or as directed by the RPR.

MATERIALS

905-2.1 Topsoil. Topsoil shall be the surface layer of soil with no admixture of refuse or any material toxic to plant growth, and it shall be reasonably free from subsoil and stumps, roots, brush, stones (2 inches (50 mm) or more in diameter), and clay lumps or similar objects. Brush and other vegetation that will not be incorporated with the soil during handling operations shall be cut and removed. Ordinary sod and herbaceous growth such as grass and weeds are not to be removed, but shall be thoroughly broken up and intermixed with the soil during handling operations. Heavy sod or other cover, which cannot be incorporated into the topsoil by discing or other means, shall be removed. The topsoil or soil mixture, unless otherwise specified or approved, shall have a pH range of approximately 5.5 pH to 7.6 pH, when tested in accordance with the methods of testing of the Association of Official Agricultural Chemists in effect on the date of invitation of bids. The organic content shall be not less than 3% nor more than 20% as determined by the wet-combustion method (chromic acid reduction). There shall be not less than 20% nor more than 80% of the material passing the 200 mesh (75 µm) sieve as determined by the wash test in accordance with ASTM C117.

Natural topsoil may be amended by the Contractor with approved materials and methods to meet the above specifications.

905-2.2 Inspection and tests. Within 10 days following acceptance of the bid, the RPR shall be notified of the source of topsoil to be furnished by the Contractor. The topsoil shall be inspected to determine if the selected soil meets the requirements specified and to determine the depth to which stripping will be permitted. At this time, the Contractor may be required to take representative soil samples from several locations within the area under consideration and to the proposed stripping depths, for testing purposes as specified in paragraph 905-2.1.

CONSTRUCTION METHODS

905-3.1 General. Areas to be topsoiled shall be shown on the plans. If topsoil is available on the site, the location of the stockpiles or areas to be stripped of topsoil and the stripping depths shall be shown on the plans.

Suitable equipment necessary for proper preparation and treatment of the ground surface, stripping of topsoil, and for the handling and placing of all required materials shall be on hand, in good condition, and approved by the RPR before the various operations are started.

905-3.2 Preparing the ground surface. Immediately prior to dumping and spreading the topsoil on any area, the surface shall be loosened by discs or spike-tooth harrows, or by other

means approved by the RPR, to a minimum depth of 2 inches (50 mm) to facilitate bonding of the topsoil to the covered subgrade soil. The surface of the area to be topsoiled shall be cleared of all stones larger than 2 inches (50 mm) in any diameter and all litter or other material which may be detrimental to proper bonding, the rise of capillary moisture, or the proper growth of the desired planting. Limited areas, as shown on the plans, which are too compact to respond to these operations shall receive special scarification.

Grades on the area to be topsoiled, which have been established by others as shown on the plans, shall be maintained in a true and even condition. Where grades have not been established, the areas shall be smooth-graded and the surface left at the prescribed grades in an even and compacted condition to prevent the formation of low places or pockets where water will stand.

905-3.3 Obtaining topsoil. Prior to the stripping of topsoil from designated areas, any vegetation, briars, stumps and large roots, rubbish or stones found on such areas, which may interfere with subsequent operations, shall be removed using methods approved by the RPR. Heavy sod or other cover, which cannot be incorporated into the topsoil by discing or other means shall be removed.

When suitable topsoil is available on the site, the Contractor shall remove this material from the designated areas and to the depth as directed by the RPR. The topsoil shall be spread on areas already tilled and smooth-graded, or stockpiled in areas approved by the RPR. Any topsoil stockpiled by the Contractor shall be rehandled and placed without additional compensation. Any topsoil that has been stockpiled on the site by others, and is required for topsoil purposes, shall be removed and placed by the Contractor. The sites of all stockpiles and areas adjacent thereto which have been disturbed by the Contractor shall be graded if required and put into a condition acceptable for seeding.

When suitable topsoil is secured off the airport site, the Contractor shall locate and obtain the supply, subject to the approval of the RPR. The Contractor shall notify the RPR sufficiently in advance of operations in order that necessary measurements and tests can be made. The Contractor shall remove the topsoil from approved areas and to the depth as directed. The topsoil shall be hauled to the site of the work and placed for spreading, or spread as required. Any topsoil hauled to the site of the work and stockpiled shall be rehandled and placed without additional compensation.

905-3.4 Placing topsoil. The topsoil shall be evenly spread on the prepared areas to a uniform depth of 2 inches (50 mm) after compaction, unless otherwise shown on the plans or stated in the special provisions. Spreading shall not be done when the ground or topsoil is frozen, excessively wet, or otherwise in a condition detrimental to the work. Spreading shall be carried on so that turfing operations can proceed with a minimum of soil preparation or tilling.

After spreading, any large, stiff clods and hard lumps shall be broken with a pulverizer or by other effective means, and all stones or rocks (2 inches (50 mm) or more in diameter), roots, litter, or any foreign matter shall be raked up and disposed of by the Contractor. after spreading is completed, the topsoil shall be satisfactorily compacted by rolling with a cultipacker or by other means approved by the RPR. The compacted topsoil surface shall conform to the required lines, grades, and cross-sections. Any topsoil or other dirt falling upon pavements as a result of hauling or handling of topsoil shall be promptly removed.

METHOD OF MEASUREMENT

905-4.1 Topsoil obtained on the site shall be measured by the number of cubic yards (cubic meters) of topsoil measured in its original position and stripped or excavated. Topsoil stockpiled by others and removed for topsoil by the Contractor shall be measured by the number of cubic yards (cubic meters) of topsoil measured in the stockpile. Topsoil shall be measured by volume in cubic yards (cubic meters) computed by the method of end areas.

905-4.2 Topsoil obtained off the site shall be measured by the number of cubic yards (cubic meters) of topsoil measured in its original position and stripped or excavated. Topsoil shall be measured by volume in cubic yards (meters) computed by the method of end areas.

BASIS OF PAYMENT

905-5.1 Payment will be made at the contract unit price per cubic yard for topsoil (obtained on the site). This price shall be full compensation for furnishing all materials and for all preparation, placing, and spreading of the materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

905-5.2 Payment will be made at the contract unit price per cubic yard for topsoil (obtained off the site). This price shall be full compensation for furnishing all materials and for all preparation, placing, and spreading of the materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item T-905-5.1	Topsoil, 2”- per cubic yard

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM C117	Materials Finer than 75 μm (No. 200) Sieve in Mineral Aggregates by Washing

Advisory Circulars (AC)

AC 150/5200-33	Hazardous Wildlife Attractants on or Near Airports

FAA/United States Department of Agriculture

Wildlife Hazard Management at Airports, A Manual for Airport Personnel

END OF ITEM T-905

ITEM L-108 UNDERGROUND POWER CABLE FOR AIRPORTS

DESCRIPTION

108-1.1 This item shall consist of furnishing and installing power cables that are direct buried and furnishing and/or installing power cables within conduit or duct banks per these specifications at the locations shown on the plans. It includes excavation and backfill of trench for direct-buried cables only. Also included are the installation of counterpoise wires, ground wires, ground rods and connections, cable splicing, cable marking, cable testing, and all incidentals necessary to place the cable in operating condition as a completed unit to the satisfaction of the RPR. This item shall not include the installation of duct banks or conduit, trenching and backfilling for duct banks or conduit, or furnishing or installation of cable for FAA owned/operated facilities.

EQUIPMENT AND MATERIALS

108-2.1 General.

a. Airport lighting equipment and materials covered by advisory circulars (AC) shall be approved under the Airport Lighting Equipment Certification Program per AC 150/5345-53, current version.

b. All other equipment and materials covered by other referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification, when requested by the RPR.

c. Manufacturer's certifications shall not relieve the Contractor of the responsibility to provide materials per these specifications. Materials supplied and/or installed that do not comply with these specifications shall be removed (when directed by the RPR) and replaced with materials that comply with these specifications at the Contractor's cost.

d. All materials and equipment used to construct this item shall be submitted to the RPR for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify products or models applicable to this project. Indicate all optional equipment and delete any non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment to which they apply on each submittal sheet. Markings shall be made bold and clear with arrows or circles (highlighting is not acceptable). The Contractor is solely responsible for delays in the project that may accrue directly or indirectly from late submissions or resubmissions of submittals.

e. The data submitted shall be sufficient, in the opinion of the RPR, to determine compliance with the plans and specifications. The Contractor's submittals shall be electronically submitted in pdf format**.** The RPR reserves the right to reject any and all equipment, materials, or procedures that do not meet the system design and the standards and codes, specified in this document.

f. All equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for at least twelve (12) months from the date of final acceptance by the Owner. The defective materials and/or equipment shall be repaired or replaced, at the

Owner's discretion, with no additional cost to the Owner. The Contractor shall maintain a minimum insulation resistance in accordance with paragraph 108-3.10e with isolation transformers connected in new circuits and new segments of existing circuits through the end of the contract warranty period when tested in accordance with AC 150/5340-26, *Maintenance Airport Visual Aid Facilities*, paragraph 5.1.3.1, Insulation Resistance Test.

108-2.2 Cable. Underground cable for airfield lighting facilities (runway and taxiway lights and signs) shall conform to the requirements of AC 150/5345-7, Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits latest edition. Conductors for use on 6.6 ampere primary airfield lighting series circuits shall be single conductor, seven strand, #8 American wire gauge (AWG), L-824 Type C, 5,000 volts, non-shielded, with cross-linked polyethylene insulation.

Conductors for use on 20 ampere primary airfield lighting series circuits shall be single conductor, seven strand, #6 AWG, L-824 , Type C 5,000 volts, non-shielded, with cross-linked polyethylene insulation. L-824 conductors for use on the L-830 secondary of airfield lighting series circuits shall be sized in accordance with the manufacturer's recommendations. All other conductors shall comply with FAA and National Electric Code (NEC) requirements. Conductor sizes noted above shall not apply to leads furnished by manufacturers on airfield lighting transformers and fixtures.

Wire for electrical circuits up to 600 volts shall comply with Specification L-824 and/or Commercial Item Description A-A-59544A and shall be type THWN-2, 75°C for installation in conduit and RHW-2, 75°C for direct burial installations. Conductors for parallel (voltage) circuits shall be type and size and installed in accordance with NFPA-70, National Electrical Code.

Unless noted otherwise, all 600-volt and less non-airfield lighting conductor sizes are based on a 75°C, THWN-2, 600-volt insulation, copper conductors, not more than three single insulated conductors, in raceway, in free air. The conduit/duct sizes are based on the use of THWN-2, 600-volt insulated conductors. The Contractor shall make the necessary increase in conduit/duct sizes for other types of wire insulation. In no case shall the conduit/duct size be reduced. The minimum power circuit wire size shall be #12 AWG.

Conductor sizes may have been adjusted due to voltage drop or other engineering considerations. Equipment provided by the Contractor shall be capable of accepting the quantity and sizes of conductors shown in the Contract Documents. All conductors, pigtails, cable step-down adapters, cable step-up adapters, terminal blocks and splicing materials necessary to complete the cable termination/splice shall be considered incidental to the respective pay items provided.

Cable type, size, number of conductors, strand and service voltage shall be as specified in the Contract Document.

108-2.3 Bare copper wire (counterpoise, bare copper wire ground and ground rods). Wire for counterpoise or ground installations for airfield lighting systems shall be No. 6 AWG bare solid copper wire for counterpoise and/or No. 6 AWG insulated stranded for grounding bond wire per ASTM B3 and ASTM B8, and shall be bare tinned copper wire per ASTM B33. For voltage powered circuits, the equipment grounding conductor shall comply with NEC Article 250.

Ground rods shall be sectional copper-clad steel. The ground rods shall be of the length and diameter specified on the plans, but in no case be less than 10 feet long and 3/4 inch in diameter.

108-2.4 Cable connections. In-line connections or splices of underground primary cables shall be of the type called for on the plans, and shall be one of the types listed below. No separate payment will be made for cable connections.

a. The cast splice. A cast splice, employing a plastic mold and using epoxy resin equivalent to that manufactured by 3M™ Company, "Scotchcast" Kit No. 82-B, or an approved equivalent, used for potting the splice is acceptable.

b. The field-attached plug-in splice. Field attached plug-in splices shall be installed as shown on the plans. The Contractor shall determine the outside diameter of the cable to be spliced and furnish appropriately sized connector kits and/or adapters. Tape or heat shrink tubing with integral sealant shall be in accordance with the manufacturer's requirements. Primary Connector Kits manufactured by Amerace, "Super Kit", Integro "Complete Kit", or approved equal is acceptable**.**

c. The factory-molded plug-in splice. Specification for L-823 Connectors, Factory-Molded to Individual Conductors, is acceptable.

d. The taped or heat-shrink splice. Taped splices employing field-applied rubber, or synthetic rubber tape covered with plastic tape is acceptable. The rubber tape should meet the requirements of ASTM D4388 and the plastic tape should comply with Military Specification MIL-I-24391 or Commercial Item Description A-A-55809. Heat shrinkable tubing shall be heavy-wall, self-sealing tubing rated for the voltage of the wire being spliced and suitable for direct-buried installations. The tubing shall be factory coated with a thermoplastic adhesive-sealant that will adhere to the insulation of the wire being spliced forming a moisture- and dirt-proof seal. Additionally, heat shrinkable tubing for multi-conductor cables, shielded cables, and armored cables shall be factory kits that are designed for the application. Heat shrinkable tubing and tubing kits shall be manufactured by Tyco Electronics/ Raychem Corporation, Energy Division, or approved equivalent.

In all the above cases, connections of cable conductors shall be made using crimp connectors using a crimping tool designed to make a complete crimp before the tool can be removed. All L-823/L-824 splices and terminations shall be made per the manufacturer's recommendations and listings.

All connections of counterpoise, grounding conductors and ground rods shall be made by the exothermic process or approved equivalent, except that a light base ground clamp connector shall be used for attachment to the light base. All exothermic connections shall be made per the manufacturer's recommendations and listings.

108-2.5 Splicer qualifications. Every airfield lighting cable splicer shall be qualified in making airport cable splices and terminations on cables rated at or above 5,000 volts AC. The Contractor shall submit to the RPR proof of the qualifications of each proposed cable splicer for the airport cable type and voltage level to be worked on. Cable splicing/terminating personnel shall have a minimum of three (3) years continuous experience in terminating/splicing medium voltage cable.

108-2.6 Concrete. Concrete shall be proportioned, placed, and cured per Item P-610, Concrete for Miscellaneous Structures.

108-2.7 Flowable backfill. Flowable material used to backfill trenches for power cable trenches shall conform to the requirements of Item P-153, Controlled Low Strength Material.

108-2.8 Cable identification tags. Cable identification tags shall be made from a non-corrosive material with the circuit identification stamped or etched onto the tag. The tags shall be of the type as detailed on the plans.

108-2.9 Tape. Electrical tapes shall be Scotch™ Electrical Tapes –Scotch™ 88 (1-1/2 inch (38 mm) wide) and Scotch™ 130C® linerless rubber splicing tape (2-inch (50 mm) wide), as manufactured by the Minnesota Mining and Manufacturing Company (3M™), or an approved equivalent.

108-2.10 Electrical coating. Electrical coating shall be Scotchkote™ as manufactured by 3M™, or an approved equivalent.

108-2.11 Existing circuits. Whenever the scope of work requires connection to an existing circuit, the existing circuit's insulation resistance shall be tested, in the presence of the RPR. The test shall be performed per this item and prior to any activity that will affect the respective circuit. The Contractor shall record the results on forms acceptable to the RPR. When the work affecting the circuit is complete, the circuit's insulation resistance shall be checked again, in the presence of the RPR. The Contractor shall

record the results on forms acceptable to the RPR. The second reading shall be equal to or greater than the first reading or the Contractor shall make the necessary repairs to the existing circuit to bring the second reading above the first reading. All repair costs including a complete replacement of the L-823 connectors, L-830 transformers and L-824 cable, if necessary, shall be borne by the Contractor. All test results shall be submitted in the Operation and Maintenance (O&M) Manual.

108-2.12 Detectable warning tape. Plastic, detectable, American Public Works Association (APWA) Red (electrical power lines, cables, conduit and lighting cable) with continuous legend tape shall be polyethylene film with a metalized foil core and shall be 3-6 inches (75-150 mm) wide. Detectable tape is incidental to the respective bid item. Detectable warning tape for communication cables shall be orange. Detectable warning tape color code shall comply with the APWA Uniform Color Code.

CONSTRUCTION METHODS

108-3.1 General. The Contractor shall install the specified cable at the approximate locations indicated on the plans. Unless otherwise shown on the plans, all cable required to cross under pavements expected to carry aircraft loads shall be installed in concrete encased duct banks. Cable shall be run without splices, from fixture to fixture.

Cable connections between lights will be permitted only at the light locations for connecting the underground cable to the primary leads of the individual isolation transformers. The Contractor shall be responsible for providing cable in continuous lengths for home runs or other long cable runs without connections unless otherwise authorized in writing by the RPR or shown on the plans.

In addition to connectors being installed at individual isolation transformers, L-823 cable connectors for maintenance and test points shall be installed at locations shown on the plans. Cable circuit identification markers shall be installed on both sides of the L-823 connectors installed and on both sides of slack loops where a future connector would be installed.

Provide not less than 3 feet (1 m) of cable slack on each side of all connections, isolation transformers, light units, and at points where cable is connected to field equipment. Where provisions must be made for testing or for future above grade connections, provide enough slack to allow the cable to be extended at least one foot (30 cm) vertically above the top of the access structure. This requirement also applies where primary cable passes through empty light bases, junction boxes, and access structures to allow for future connections, or as designated by the RPR.

Primary airfield lighting cables installed shall have cable circuit identification markers attached on both sides of each L-823 connector and on each airport lighting cable entering or leaving cable access points, such as manholes, hand holes, pull boxes, junction boxes, etc. Markers shall be of sufficient length for imprinting the cable circuit identification legend on one line, using letters not less than 1/4 inch (6 mm) in size. The cable circuit identification shall match the circuits noted on the construction plans.

108-3.2 Installation in duct banks or conduits. This item includes the installation of the cable in duct banks or conduit per the following paragraphs. The maximum number and voltage ratings of cables installed in each single duct or conduit, and the current-carrying capacity of each cable shall be per the latest version of the National Electric Code, or the code of the local agency or authority having jurisdiction.

The Contractor shall make no connections or splices of any kind in cables installed in conduits or duct banks.

Unless otherwise designated in the plans, where ducts are in tiers, use the lowest ducts to receive the cable first, with spare ducts left in the upper levels. Check duct routes prior to construction to obtain assurance that the shortest routes are selected and that any potential interference is avoided.

Duct banks or conduits shall be installed as a separate item per Item L-110, Airport Underground Electrical Duct Banks and Conduit. The Contractor shall run a mandrel through duct banks or conduit prior to installation of cable to ensure that the duct bank or conduit is open, continuous and clear of debris. The mandrel size shall be compatible with the conduit size. The Contractor shall swab out all conduits/ducts and clean light bases, manholes, etc., interiors immediately prior to pulling cable. Once cleaned and swabbed, the light bases and all accessible points of entry to the duct/conduit system shall be kept closed except when installing cables. Cleaning of ducts, light bases, manholes, etc., is incidental to the pay item of the item being cleaned. All raceway systems left open, after initial cleaning, for any reason shall be re-cleaned at the Contractor's expense. The Contractor shall verify existing ducts proposed for use in this project as clear and open. The Contractor shall notify the RPR of any blockage in the existing ducts.

The cable shall be installed in a manner that prevents harmful stretching of the conductor, damage to the insulation, or damage to the outer protective covering. The ends of all cables shall be sealed with moisture-seal tape providing moisture-tight mechanical protection with minimum bulk, or alternately, heat shrinkable tubing before pulling into the conduit and it shall be left sealed until connections are made. Where more than one cable is to be installed in a conduit, all cable shall be pulled in the conduit at the same time. The pulling of a cable through duct banks or conduits may be accomplished by hand winch or power winch with the use of cable grips or pulling eyes. Maximum pulling tensions shall not exceed the cable manufacturer's recommendations. A non-hardening cable-pulling lubricant recommended for the type of cable being installed shall be used where required.

The Contractor shall submit the recommended pulling tension values to the RPR prior to any cable installation. If required by the RPR, pulling tension values for cable pulls shall be monitored by a dynamometer in the presence of the RPR. Cable pull tensions shall be recorded by the Contractor and reviewed by the RPR. Cables exceeding the maximum allowable pulling tension values shall be removed and replaced by the Contractor at the Contractor's expense.

The manufacturer's minimum bend radius or NEC requirements (whichever is more restrictive) shall apply. Cable installation, handling and storage shall be per manufacturer's recommendations. During cold weather, particular attention shall be paid to the manufacturer's minimum installation temperature. Cable shall not be installed when the temperature is at or below the manufacturer's minimum installation temperature. At the Contractor's option, the Contractor may submit a plan, for review by the RPR, for heated storage of the cable and maintenance of an acceptable cable temperature during installation when temperatures are below the manufacturer's minimum cable installation temperature.

Cable shall not be dragged across base can or manhole edges, pavement or earth. When cable must be coiled, lay cable out on a canvas tarp or use other appropriate means to prevent abrasion to the cable jacket.

108-3.3 Installation of direct-buried cable in trenches. Unless otherwise specified, the Contractor shall not use a cable plow for installing the cable. Cable shall be unreeled uniformly in place alongside or in the trench and shall be carefully placed along the bottom of the trench. The cable shall not be unreeled and pulled into the trench from one end. Slack cable sufficient to provide strain relief shall be placed in the trench in a series of S curves. Sharp bends or kinks in the cable shall not be permitted.

Where cables must cross over each other, a minimum of 3 inches (75 mm) vertical displacement shall be provided with the topmost cable depth at or below the minimum required depth below finished grade.

a. Trenching. Where turf is well established and the sod can be removed, it shall be carefully stripped and properly stored. Trenches for cables may be excavated manually or with mechanical trenching equipment. Walls of trenches shall be essentially vertical so that a minimum of surface is disturbed. Graders shall not be used to excavate the trench with their blades. The bottom surface of trenches shall be essentially smooth and free from coarse aggregate. Unless otherwise specified, cable

trenches shall be excavated to a minimum depth of 18 inches (0.5 m) below finished grade per NEC Table 300.5, except as follows:

- When off the airport or crossing under a roadway or driveway, the minimum depth shall be 36 inches (91 cm) unless otherwise specified.
- Minimum cable depth when crossing under a railroad track, shall be 42 inches (1 m) unless otherwise specified.

The Contractor shall excavate all cable trenches to a width not less than 6 inches (150 mm). Unless otherwise specified on the plans, all cables in the same location and running in the same general direction shall be installed in the same trench.

When rock is encountered, the rock shall be removed to a depth of at least 3 inches (75 mm) below the required cable depth and it shall be replaced with bedding material of earth or sand containing no mineral aggregate particles that would be retained on a 1/4-inch (6.3 mm) sieve. Flowable backfill material may alternatively be used.

Duct bank or conduit markers temporarily removed for trench excavations shall be replaced as required.

It is the Contractor's responsibility to locate existing utilities within the work area prior to excavation. Where existing active cables cross proposed installations, the Contractor shall ensure that these cables are adequately protected. Where crossings are unavoidable, no splices will be allowed in the existing cables, except as specified on the plans. Installation of new cable where such crossings must occur shall proceed as follows:

(1) Existing cables shall be located manually. Unearthed cables shall be inspected to assure absolutely no damage has occurred.

(2) Trenching, etc., in cable areas shall then proceed, with approval of the RPR, with care taken to minimize possible damage or disruption of existing cable, including careful backfilling in area of cable.

In the event that any previously identified cable is damaged during the course of construction, the Contractor shall be responsible for the complete repair or replacement.

b. Backfilling. After the cable has been installed, the trench shall be backfilled. The first layer of backfill in the trench shall encompass all cables ; be 3 inches (75 mm) deep, loose measurement; and shall be either earth or sand containing no mineral aggregate particles that would be retained on a 1/4-inch (6.3 mm) sieve. This layer shall not be compacted. The second layer shall be 5 inches (125 mm) deep, loose measurement, and shall contain no particles that would be retained on a one inch (25.0 mm) sieve. The remaining third and subsequent layers of backfill shall not exceed 8 inches (20 cm) of loose measurement and be excavated or imported material and shall not contain stone or aggregate larger than 4 inches (100 mm) maximum diameter.

The second and subsequent layers shall be thoroughly tamped and compacted to at least the density of the adjacent material. If the cable is to be installed in locations or areas where other compaction requirements are specified (under pavements, embankments, etc.) the backfill compaction shall be backfilled with controlled low strength material (CLSM) in accordance with P-153**.**

Trenches shall not contain pools of water during backfilling operations. The trench shall be completely backfilled and tamped level with the adjacent surface, except that when turf is to be established over the trench, the backfilling shall be stopped at an appropriate depth consistent with the type of turfing operation to be accommodated. A proper allowance for settlement shall also be provided. Any excess excavated material shall be removed and disposed of per the plans and specifications.

Underground electrical warning (caution) tape shall be installed in the trench above all direct-buried cable. Contractor shall submit a sample of the proposed warning tape for acceptance by the RPR. If not

shown on the plans, the warning tape shall be located 6 inches (150 mm) above the direct-buried cable or the counterpoise wire if present. A6 inch (75 - 150 mm) wide polyethylene film detectable tape, with a metalized foil core, shall be installed above all direct buried cable or counterpoise. The tape shall be of the color and have a continuous legend as indicated on the plans. The tape shall be installed 8 inches (200 mm) minimum below finished grade.

c. Restoration. Following restoration of all trenching near airport movement surfaces, the Contractor shall visually inspect the area for foreign object debris (FOD) and remove any that is found. Where soil and sod has been removed, it shall be replaced as soon as possible after the backfilling is completed. All areas disturbed by work shall be restored to its original condition. The restoration shall include the sodding as shown on the plans. The Contractor shall be held responsible for maintaining all disturbed surfaces and replacements until final acceptance. When trenching is through paved areas, restoration shall be equal to existing conditions. If the cable is to be installed in locations or areas where other compaction requirements are specified (under pavements, embankments, etc.) the backfill compaction shall be backfilled with controlled low strength material (CLSM) in accordance with P-153**.** Restoration shall be considered incidental to the pay item of which it is a component part.

108-3.4 Cable markers for direct-buried cable. The location of direct buried circuits shall be marked by a concrete slab marker, 2 feet (60 cm) square and 4-6 inch (10 - 15 cm) thick, extending approximately one inch (25 mm) above the surface. Each cable run from a line of lights and signs to the equipment vault shall be marked at approximately every 200 feet (61 m) along the cable run, with an additional marker at each change of direction of cable run. All other direct-buried cable shall be marked in the same manner. Cable markers shall be installed directly above the cable. The Contractor shall impress the word "CABLE" and directional arrows on each cable marking slab. The letters shall be approximately 4 inches (100 mm) high and 3 inches (75 mm) wide, with width of stroke 1/2 inch (12 mm) and 1/4 inch (6 mm) deep. Stencils shall be used for cable marker lettering; no hand lettering shall be permitted.

At the location of each underground cable connection/splice, except at lighting units, or isolation transformers, a concrete marker slab shall be installed to mark the location of the connection/splice. The Contractor shall impress the word "SPLICE" on each slab. The Contractor also shall impress additional circuit identification symbols on each slab as directed by the RPR. All cable markers and splice markers shall be painted international orange. Paint shall be specifically manufactured for uncured exterior concrete. After placement, all cable or splice markers shall be given one coat of high-visibility aviation orange paint as approved by the RPR. Furnishing and installation of cable markers is incidental to the respective cable pay item.

108-3.5 Splicing. Connections of the type shown on the plans shall be made by experienced personnel regularly engaged in this type of work and shall be made as follows:

a. Cast splices. These shall be made by using crimp connectors for jointing conductors. Molds shall be assembled, and the compound shall be mixed and poured per the manufacturer's instructions and to the satisfaction of the RPR.

b. Field-attached plug-in splices. These shall be assembled per the manufacturer's instructions. These splices shall be made by plugging directly into mating connectors. The joint where the connectors come together shall be finished by one of the following methods: (1) wrapped with at least one layer of rubber or synthetic rubber tape and one layer of plastic tape, one-half lapped, extending at least 1-1/2 inches (38 mm) on each side of the joint (2) Covered with heat shrinkable tubing with integral sealant extending at least 1-1/2 inches (38 mm) on each side of the joint or (3) On connector kits equipped with water seal flap; roll-over water seal flap to sealing position on mating connector.

c. Factory-molded plug-in splices. These shall be made by plugging directly into mating connectors. The joint where the connectors come together shall be finished by one of the following methods: (1) Wrapped with at least one layer of rubber or synthetic rubber tape and one layer of plastic tape, one-half

lapped, extending at least 1-1/2 inches (38 mm) on each side of the joint. (2) Covered with heat shrinkable tubing with integral sealant extending at least 1-1/2 inches (38 mm) on each side of the joint. or (3) On connector kits so equipped with water seal flap; roll-over water seal flap to sealing position on mating connector.

d. Taped or heat-shrink splices. A taped splice shall be made in the following manner:

Bring the cables to their final position and cut so that the conductors will butt. Remove insulation and jacket allowing for bare conductor of proper length to fit compression sleeve connector with 1/4 inch (6 mm) of bare conductor on each side of the connector. Prior to splicing, the two ends of the cable insulation shall be penciled using a tool designed specifically for this purpose and for cable size and type. Do not use emery paper on splicing operation since it contains metallic particles. The copper conductors shall be thoroughly cleaned. Join the conductors by inserting them equidistant into the compression connection sleeve. Crimp conductors firmly in place with crimping tool that requires a complete crimp before tool can be removed. Test the crimped connection by pulling on the cable. Scrape the insulation to assure that the entire surface over which the tape will be applied (plus 3 inches (75 mm) on each end) is clean. After scraping, wipe the entire area with a clean lint-free cloth. Do not use solvents.

Apply high-voltage rubber tape one-half lapped over bare conductor. This tape should be tensioned as recommended by the manufacturer. Voids in the connector area may be eliminated by highly elongating the tape, stretching it just short of its breaking point. The manufacturer's recommendation for stretching tape during splicing shall be followed. Always attempt to exactly half-lap to produce a uniform buildup. Continue buildup to 1-1/2 times cable diameter over the body of the splice with ends tapered a distance of approximately one inch (25 mm) over the original jacket. Cover rubber tape with two layers of vinyl pressure-sensitive tape one-half lapped. Do not use glyptol or lacquer over vinyl tape as they react as solvents to the tape. No further cable covering or splice boxes are required.

Heat shrinkable tubing shall be installed following manufacturer’s instructions. Direct flame heating shall not be permitted unless recommended by the manufacturer. Cable surfaces within the limits of the heat-shrink application shall be clean and free of contaminates prior to application.

e. Assembly. Surfaces of equipment or conductors being terminated or connected shall be prepared in accordance with industry standard practice and manufacturer’s recommendations. All surfaces to be connected shall be thoroughly cleaned to remove all dirt, grease, oxides, nonconductive films, or other foreign material. Paints and other nonconductive coatings shall be removed to expose base metal. Clean all surfaces at least 1/4 inch (6.4 mm) beyond all sides of the larger bonded area on all mating surfaces. Use a joint compound suitable for the materials used in the connection. Repair painted/coated surface to original condition after completing the connection.

108-3.6 Bare counterpoise wire installation for lightning protection and grounding. If shown on the plans or included in the job specifications, bare solid #6 AWG copper counterpoise wire shall be installed for lightning protection of the underground cables. The RPR shall select one of two methods of lightning protection for the airfield lighting circuit based upon sound engineering practice and lightning strike density.

a. Equipotential. The counterpoise size is as shown on the plans. The equipotential method is applicable to all airfield lighting systems; i.e. runway, taxiway, apron – touchdown zone, centerline, edge, threshold and approach lighting systems. The equipotential method is also successfully applied to provide lightning protection for power, signal and communication systems. The light bases, counterpoise, etc – all components - are bonded together and bonded to the vault power system ground loop/electrode.

Counterpoise wire shall be installed in the same trench for the entire length of buried cable, conduits and duct banks that are installed to contain airfield cables. The counterpoise is centered over the cable/conduit/duct to be protected.

The counterpoise conductor shall be installed no less than 8 inches (200 mm) minimum or 12 inches (300 mm) maximum above the raceway or cable to be protected, except as permitted below:

(1) The minimum counterpoise conductor height above the raceway or cable to be protected shall be permitted to be adjusted subject to coordination with the airfield lighting and pavement designs.

(2) The counterpoise conductor height above the protected raceway(s) or cable(s) shall be calculated to ensure that the raceway or cable is within a 45-degree area of protection, (45 degrees on each side of vertical creating a 90 degree angle).

The counterpoise conductor shall be bonded to each metallic light base, mounting stake, and metallic airfield lighting component.

All metallic airfield lighting components in the field circuit on the output side of the constant current regulator (CCR) or other power source shall be bonded to the airfield lighting counterpoise system.

All components rise and fall at the same potential; with no potential difference, no damaging arcing and no damaging current flow.

See AC 150/5340-30, Design and Installation Details for Airport Visual Aids and NFPA 780, Standard for the Installation of Lightning Protection Systems, Chapter 11, for a detailed description of the Equipotential Method of lightning protection.

Reference FAA STD-019E, Lightning and Surge Protection, Grounding Bonding and Shielding Requirements for Facilities and Electronic Equipment, Part 4.1.1.7.

b. Isolation – Not Used

c. Common Installation requirements. When a metallic light base is used, the grounding electrode shall be bonded to the metallic light base or mounting stake with a No. 6 AWG bare, annealed or soft drawn, solid copper conductor.

Grounding electrodes may be rods, ground dissipation plates, radials, or other electrodes listed in the NFPA 70 (NEC) or NFPA 780.

Where raceway is installed by the directional bore, jack and bore, or other drilling method, the counterpoise conductor shall be permitted to be installed concurrently with the directional bore, jack and bore, or other drilling method raceway, external to the raceway or sleeve.

The counterpoise wire shall also be exothermically welded to ground rods installed as shown on the plans but not more than 500 feet (150 m) apart around the entire circuit. The counterpoise system shall be continuous and terminate at the transformer vault or at the power source. It shall be securely attached to the vault or equipment external ground ring or other made electrode-grounding system. The connections shall be made as shown on the plans and in the specifications.

Where an existing airfield lighting system is being extended or modified, the new counterpoise conductors shall be interconnected to existing counterpoise conductors at each intersection of the new and existing airfield lighting counterpoise systems.

d. Parallel Voltage Systems. Provide grounding and bonding in accordance with NFPA 70, National Electrical Code.

108-3.7 Counterpoise installation above multiple conduits and duct banks. Counterpoise wires shall be installed above multiple conduits/duct banks for airfield lighting cables, with the intent being to provide a complete area of protection over the airfield lighting cables. When multiple conduits and/or duct banks for airfield cable are installed in the same trench, the number and location of counterpoise wires above the conduits shall be adequate to provide a complete area of protection measured 45 degrees each side of vertical.

Where duct banks pass under pavement to be constructed in the project, the counterpoise shall be placed above the duct bank. Reference details on the construction plans.

108-3.8 Counterpoise installation at existing duct banks. When airfield lighting cables are indicated on the plans to be routed through existing duct banks, the new counterpoise wiring shall be terminated at ground rods at each end of the existing duct bank where the cables being protected enter and exit the duct bank. The new counterpoise conductor shall be bonded to the existing counterpoise system.

108-3.9 Exothermic bonding. Bonding of counterpoise wire shall be by the exothermic welding process or equivalent method accepted by the RPR. Only personnel experienced in and regularly engaged in this type of work shall make these connections.

Contractor shall demonstrate to the satisfaction of the RPR, the welding kits, materials and procedures to be used for welded connections prior to any installations in the field. The installations shall comply with the manufacturer's recommendations and the following:

a. All slag shall be removed from welds.

b. Using an exothermic weld to bond the counterpoise to a lug on a galvanized light base is not recommended unless the base has been specially modified. Consult the manufacturer's installation directions for proper methods of bonding copper wire to the light base. See AC 150/5340-30 for galvanized light base exception.

c. If called for in the plans, all buried copper and weld material at weld connections shall be thoroughly coated with 6 mm of 3M™ Scotchkote™, or approved equivalent, or coated with coal tar Bitumastic® material to prevent surface exposure to corrosive soil or moisture.

108-3.10 Testing. The Contractor shall furnish all necessary equipment and appliances for testing the airport electrical systems and underground cable circuits before and after installation. The Contractor shall perform all tests in the presence of the RPR. The Contractor shall demonstrate the electrical characteristics to the satisfaction of the RPR. All costs for testing are incidental to the respective item being tested. For phased projects, the tests must be completed by phase. The Contractor must maintain the test results throughout the entire project as well as during the warranty period that meet the following:

a. Earth resistance testing methods shall be submitted to the RPR for approval. Earth resistance testing results shall be recorded on an approved form and testing shall be performed in the presence of the RPR. All such testing shall be at the sole expense of the Contractor.

b. Should the counterpoise or ground grid conductors be damaged or suspected of being damaged by construction activities the Contractor shall test the conductors for continuity with a low resistance ohmmeter. The conductors shall be isolated such that no parallel path exists and tested for continuity. The RPR shall approve of the test method selected. All such testing shall be at the sole expense of the Contractor.

After installation, the Contractor shall test and demonstrate to the satisfaction of the RPR the following:

c. That all affected lighting power and control circuits (existing and new) are continuous and free from short circuits.

d. That all affected circuits (existing and new) are free from unspecified grounds.

e. That the insulation resistance to ground of all new non-grounded high voltage series circuits or cable segments is not less than 500 megohms. Verify continuity of all series airfield lighting circuits prior to energization.

f. That the insulation resistance to ground of all new non-grounded conductors of new multiple circuits or circuit segments is not less than 100 megohms.

g. That all affected circuits (existing and new) are properly connected per applicable wiring diagrams.

h. That all affected circuits (existing and new) are operable. Tests shall be conducted that include operating each control not less than 10 times and the continuous operation of each lighting and power circuit for not less than 1/2 hour.

i. That the impedance to ground of each ground rod does not exceed 25 ohms prior to establishing connections to other ground electrodes. The fall-of-potential ground impedance test shall be used, as described by American National Standards Institute/Institute of Electrical and Electronic Engineers (ANSI/IEEE) Standard 81, to verify this requirement. As an alternate, clamp-on style ground impedance test meters may be used to satisfy the impedance testing requirement. Test equipment and its calibration sheets shall be submitted for review and approval by the RPR prior to performing the testing.

Two copies of tabulated results of all cable tests performed shall be supplied by the Contractor to the RPR. Where connecting new cable to existing cable, insulation resistance tests shall be performed on the new cable prior to connection to the existing circuit.

There are no approved “repair” procedures for items that have failed testing other than complete replacement.

METHOD OF MEASUREMENT

108-4.1 Trenching shall be measured by the linear feet (meters) of trench, including the excavation, backfill, and restoration, completed, measured as excavated, and accepted as satisfactory. When specified, separate measurement shall be made for trenches of various specified widths.

The cost of all excavation, backfill, dewatering and restoration regardless of the type of material encountered shall be included in the unit price bid for the work.

108-4.2 Cable or counterpoise wire installed in trench, duct bank or conduit shall be measured by the number of linear feet (meters) installed and grounding connectors, and trench marking tape ready for operation, and accepted as satisfactory. Separate measurement shall be made for each cable or counterpoise wire installed in trench, duct bank or conduit. The measurement for this item shall not include additional quantities required for slack. Cable and counterpoise slack is considered incidental to this item and is included in the contractor’s unit price. No separate measurement or payment will be made for cable or counterpoise slack.

108-4.3 Ground rods shall be measured by each 10-foot section installed.

BASIS OF PAYMENT

108-5.1 Payment will be made at the contract unit price for trenching, cable and bare counterpoise wire installed in trench (direct-buried), or cable and equipment ground installed in duct bank or conduit, in place by the Contractor and accepted by the RPR. This price shall be full compensation for furnishing all materials and for all preparation and installation of these materials, and for all labor, equipment, tools, and incidentals, including ground rods and ground connectors and trench marking tape, necessary to complete this item.

Payment will be made under:

Item L-108-5.1	Hand excavate minimum 8" Wide x 28" Deep in earth. Includes all labor, hand excavation, backfill and sod restoration, complete in place. - Price per linear foot.

Item L-108-5.2	Saw cut and hand excavate minimum 8" Wide x 28" Deep in existing full strength pavement. Includes all labor, hand excavation, saw cutting, backfill, concrete, pavement repair, complete in place. - Price per linear foot.
Item L-108-5.3	3/4" x 20' ground rods connected to counterpoise. Includes all labor, ground rods, excavation, splice kits, testing, backfill, connections, exothermic welds, and etc., complete in place. - Price per each.
Item L-108-5.4	Additional 10’ ground rod sections. Includes all labor, ground rods, excavation, splice kits, testing, backfill, connections, exothermic welds and etc., complete in place - Price per each.
Item L-108-5.5	#6 bare solid AWG counterpoise conductor installed over conduit system. Includes all labor, conductors, splice kits, exothermic welds, testing, excavation, backfill, and etc. complete in place. - Price per linear foot.
Item L-108-5.6	#8, 5KV, L-824 conductor installed in new and existing conduit/ ductbank system. Includes all labor, conductors, testing, cleaning and dewatering, removal and disposal of existing conductors, pull string, pulling compound, identification, connector kits, and etc., complete in place. - Price per linear foot.

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

Advisory Circulars (AC)

AC 150/5340-26	Maintenance of Airport Visual Aid Facilities
AC 150/5340-30	Design and Installation Details for Airport Visual Aids
AC 150/5345-7	Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits
AC 150/5345-26	Specification for L-823 Plug and Receptacle, Cable Connectors
AC 150/5345-53	Airport Lighting Equipment Certification Program

Commercial Item Description

A-A-59544A	Cable and Wire, Electrical (Power, Fixed Installation)
A-A-55809	Insulation Tape, Electrical, Pressure-Sensitive Adhesive, Plastic

ASTM International (ASTM)

ASTM B3	Standard Specification for Soft or Annealed Copper Wire
ASTM B8	Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft

ASTM B33	Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes
ASTM D4388	Standard Specification for Nonmetallic Semi-Conducting and Electrically Insulating Rubber Tapes

Mil Spec

MIL-PRF-23586F	Performance Specification: Sealing Compound (with Accelerator), Silicone Rubber, Electrical
MIL-I-24391	Insulation Tape, Electrical, Plastic, Pressure Sensitive

National Fire Protection Association (NFPA)

NFPA-70	National Electrical Code (NEC)
NFPA-780	Standard for the Installation of Lightning Protection Systems

American National Standards Institute (ANSI)/Institute of Electrical and Electronics Engineers (IEEE)

ANSI/IEEE STD 81	IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System

Federal Aviation Administration Standard

FAA STD-019E	Lightning and Surge Protection, Grounding Bonding and Shielding Requirements for Facilities and Electronic Equipment

TESTING REPORT

CIRCUIT MEASURING TEST DATA

Airport _____ Date _____

Location _____ Job# _____

Project ID _____

Item Under Test	Cable Length	Duct _____ Buried_____
Number of Conductor	Conductor Size	Type Class Insulation
Voltage Rating	Age	Type of Test Performed

Circuit	Test Time	Test V	Leakage / Ohms Res A-GND

Remarks_____

_____

_____

TESTING REPORT

GROUND RESISTANCE MEASURING TEST DATA

Airport _____ Date _____

Type of Testing Equipment_____ Job# _____

Project ID _____

Location	Length and Diameter of Ground Rod	Ohms Resistance to Ground

Remarks_____

_____

_____

_____

END OF ITEM L-108

ITEM L-110 AIRPORT UNDERGROUND ELECTRICAL DUCT BANKS AND CONDUITS

DESCRIPTION

110-1.1 This item shall consist of underground electrical conduits and duct banks (single or multiple conduits encased in concrete or buried in sand) installed per this specification at the locations and per the dimensions, designs, and details shown on the plans. This item shall include furnishing and installing of all underground electrical duct banks and individual and multiple underground conduits. It shall also include all turfing trenching, backfilling, removal, and restoration of any paved or turfed areas; concrete encasement, mandrelling, pulling lines, duct markers, plugging of conduits, and the testing of the installation as a completed system ready for installation of cables per the plans and specifications. This item shall also include furnishing and installing conduits and all incidentals for providing positive drainage of the system. Verification of existing ducts is incidental to the pay items provided in this specification.

EQUIPMENT AND MATERIALS

110-2.1 General.

a. All equipment and materials covered by referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when requested by the RPR.

b. Manufacturer's certifications shall not relieve the Contractor of the responsibility to provide materials per these specifications and acceptable to the RPR. Materials supplied and/or installed that do not comply with these specifications shall be removed, when directed by the RPR and replaced with materials, that comply with these specifications, at the Contractor's cost.

c. All materials and equipment used to construct this item shall be submitted to the RPR for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify products or models applicable to this project. Indicate all optional equipment and delete non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment for which they apply on each submittal sheet. Markings shall be made bold and clear with arrows or circles (highlighting is not acceptable). The Contractor is solely responsible for delays in project that accrue directly or indirectly from late submissions or resubmissions of submittals.

d. The data submitted shall be sufficient, in the opinion of the RPR, to determine compliance with the plans and specifications. The Contractor's submittals shall be electronically submitted in pdf format, tabbed by specification section. The RPR reserves the right to reject any and all equipment, materials or procedures that do not meet the system design and the standards and codes specified in this document.

e. All equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for a period of at least twelve (12) months from final acceptance by the Owner. The defective materials and/or equipment shall be repaired or replaced, at the Owner's discretion, with no additional cost to the Owner.

110-2.2 Steel conduit. Rigid galvanized steel (RGS) conduit and fittings shall be hot dipped galvanized inside and out and conform to the requirements of Underwriters Laboratories Standards 6, 514B, and 1242. All RGS conduits or RGS elbows installed below grade, in concrete, permanently wet locations or other similar environments shall be painted with a 10-mil thick coat of asphaltum sealer or shall have a factory-bonded polyvinyl chloride (PVC) cover. Any exposed galvanizing or steel shall be coated with 10 mils of asphaltum sealer. When using PVC coated RGS conduit, care shall be exercised not to damage the factory PVC coating. Damaged PVC coating shall be repaired per the manufacturer's written instructions. In lieu of PVC coated RGS, corrosion wrap tape shall be permitted to be used where RGS is in contact with direct earth."

110-2.3 Plastic conduit. Plastic conduit and fittings-shall conform to the following requirements:

- UL 514B covers W-C-1094-Conduit fittings all types, classes 1 thru 3 and 6 thru 10.
- UL 514C covers W-C-1094- all types, Class 5 junction box and cover in plastic (PVC).
- UL 651 covers W-C-1094-Rigid PVC Conduit, types I and II, Class 4.
- UL 651A covers W-C-1094-Rigid PVC Conduit and high-density polyethylene (HDPE) Conduit type III and Class 4.

Underwriters Laboratories Standards UL-651 and Article 352 of the current National Electrical Code shall be one of the following, as shown on the plans:

a. Type I–Schedule 40 and Schedule 80 PVC suitable for underground use either direct-buried or encased in concrete.

b. Type II–Schedule 40 PVC suitable for either above ground or underground use.

c. Type III – Schedule 80 PVC suitable for either above ground or underground use either direct-buried or encased in concrete.

d. Type III –HDPE pipe, minimum standard dimensional ratio (SDR) 11, suitable for placement with directional boring under pavement.

The type of solvent cement shall be as recommended by the conduit/fitting manufacturer.

110-2.4 Split conduit. Split conduit shall be pre-manufactured for the intended purpose and shall be made of steel or plastic.

110-2.5 Conduit spacers. Conduit spacers shall be prefabricated interlocking units manufactured for the intended purpose. They shall be of double wall construction made of high grade, high density polyethylene complete with interlocking cap and base pads. They shall be designed to accept No. 4 reinforcing bars installed vertically.

110-2.6 Concrete. Concrete shall be proportioned, placed, and cured per Item P-610, Concrete for Miscellaneous Structures.

110-2.7 Precast concrete structures. Precast concrete structures shall be furnished by a plant meeting National Precast Concrete Association Plant Certification Program or another RPR approved third party certification program. Precast concrete structures shall conform to ASTM C478.

110-2.8 Flowable backfill. Flowable material used to back fill conduit and duct bank trenches shall conform to the requirements of Item P-153, Controlled Low Strength Material.

110-2.9 Detectable warning tape. Plastic, detectable, American Public Works Association (APWA) red (electrical power lines, cables, conduit and lighting cable), orange (telephone/fiber optic cabling) with continuous legend magnetic tape shall be polyethylene film with a metallized foil core and shall be 3-6 inches (75-150 mm) wide. Detectable tape is incidental to the respective bid item.

CONSTRUCTION METHODS

110-3.1 General. The Contractor shall install underground duct banks and conduits at the approximate locations indicated on the plans. The RPR shall indicate specific locations as the work progresses, if required to differ from the plans. Duct banks and conduits shall be of the size, material, and type indicated on the plans or specifications. Where no size is indicated on the plans or in the specifications, conduits shall be not less than 2 inches (50 mm) inside diameter or comply with the National Electrical Code based on cable to be installed, whichever is larger. All duct bank and conduit lines shall be laid so as to grade toward access points and duct or conduit ends for drainage. Unless shown otherwise on the plans, grades shall be at least 3 inches (75 mm) per 100 feet (30 m). On runs where it is not practicable to maintain the grade all one way, the duct bank and conduit lines shall be graded from the center in both directions toward access points or conduit ends, with a drain into the storm drainage system. Pockets or traps where moisture may accumulate shall be avoided. Under pavement, the top of the duct bank shall not be less than 18 inches (0.5 m) below the subgrade; in other locations, the top of the duct bank or underground conduit shall be not less than 18 inches (0.5 m) below finished grade.

The Contractor shall mandrel each individual conduit whether the conduit is direct-buried or part of a duct bank. An iron-shod mandrel, not more than 1/4 inch (6 mm) smaller than the bore of the conduit shall be pulled or pushed through each conduit. The mandrel shall have a leather or rubber gasket slightly larger than the conduit hole.

The Contractor shall swab out all conduits/ducts and clean base can, manhole, pull boxes, etc., interiors immediately prior to pulling cable. Once cleaned and swabbed the light bases, manholes, pull boxes, etc., and all accessible points of entry to the duct/conduit system shall be kept closed except when installing cables. Cleaning of ducts, base cans, manholes, etc., is incidental to the pay item of the item being cleaned. All raceway systems left open, after initial cleaning, for any reason shall be recleaned at the Contractor’s expense. All accessible points shall be kept closed when not installing cable. The Contractor shall verify existing ducts proposed for use in this project as clear and open. The Contractor shall notify the RPR of any blockage in the existing ducts.

For pulling the permanent wiring, each individual conduit, whether the conduit is direct-buried or part of a duct bank, shall be provided with a 200-pound (90 kg) test polypropylene pull rope. The ends shall be secured and sufficient length shall be left in access points to prevent it from slipping back into the conduit. Where spare conduits are installed, as indicated on the plans, the open ends shall be plugged with removable tapered plugs, designed for this purpose.

All conduits shall be securely fastened in place during construction and shall be plugged to prevent contaminants from entering the conduits. Any conduit section having a defective joint shall not be installed. Ducts shall be supported and spaced apart using approved spacers at intervals not to exceed 5 feet (1.5 m).

Unless otherwise shown on the plans, concrete encased duct banks shall be used when crossing under pavements expected to carry aircraft loads, such as runways, taxiways, taxilanes, ramps and aprons. When under paved shoulders and other paved areas, conduit and duct banks shall be encased using flowable fill for protection.

All conduits within concrete encasement of the duct banks shall terminate with female ends for ease in current and future use. Install factory plugs in all unused ends. Do not cover the ends or plugs with concrete.

Where turf is well established and the sod can be removed, it shall be carefully stripped and properly stored.

Trenches for conduits and duct banks may be excavated manually or with mechanical trenching equipment unless in pavement, in which case they shall be excavated with mechanical trenching

equipment. Walls of trenches shall be essentially vertical so that a minimum of shoulder surface is disturbed. Blades of graders shall not be used to excavate the trench.

When rock is encountered, the rock shall be removed to a depth of at least 3 inches (75 mm) below the required conduit or duct bank depth and it shall be replaced with bedding material of earth or sand containing no mineral aggregate particles that would be retained on a 1/4-inch (6.3 mm) sieve. Flowable backfill may alternatively be used.

Underground electrical warning (Caution) tape shall be installed in the trench above all underground duct banks and conduits in unpaved areas. Contractor shall submit a sample of the proposed warning tape for approval by the RPR. If not shown on the plans, the warning tape shall be located 6 inches above the duct/conduit or the counterpoise wire if present.

Joints in plastic conduit shall be prepared per the manufacturer's recommendations for the particular type of conduit. Plastic conduit shall be prepared by application of a plastic cleaner and brushing a plastic solvent on the outside of the conduit ends and on the inside of the couplings. The conduit fitting shall then be slipped together with a quick one-quarter turn twist to set the joint tightly. Where more than one conduit is placed in a single trench, or in duct banks, joints in the conduit shall be staggered a minimum of 2 feet (60 cm).

Changes in direction of runs exceeding 10 degrees, either vertical or horizontal, shall be accomplished using manufactured sweep bends.

Whether or not specifically indicated on the drawings, where the soil encountered at established duct bank grade is an unsuitable material, as determined by the RPR, the unsuitable material shall be removed per Item P-152 and replaced with suitable material. Additional duct bank supports shall be installed, as approved by the RPR.

All excavation shall be unclassified and shall be considered incidental to Item L-110. Dewatering necessary for duct installation, and erosion per federal, state, and local requirements is incidental to Item L-110.

Unless otherwise specified, excavated materials that are deemed by the RPR to be unsuitable for use in backfill or embankments shall be removed and disposed of offsite.

Any excess excavation shall be filled with suitable material approved by the RPR and compacted per Item P-152.

It is the Contractor's responsibility to locate existing utilities within the work area prior to excavation. Where existing active cables) cross proposed installations, the Contractor shall ensure that these cables are adequately protected. Where crossings are unavoidable, no splices will be allowed in the existing cables, except as specified on the plans. Installation of new cable where such crossings must occur shall proceed as follows:

a. Existing cables shall be located manually. Unearthed cables shall be inspected to assure absolutely no damage has occurred

b. Trenching, etc., in cable areas shall then proceed with approval of the RPR, with care taken to minimize possible damage or disruption of existing cable, including careful backfilling in area of cable.

In the event that any previously identified cable is damaged during the course of construction, the Contractor shall be responsible for the complete repair.

110-3.2 Duct banks. Unless otherwise shown in the plans, duct banks shall be installed so that the top of the concrete envelope is not less than 18 inches (0.5 m) below the bottom of the base or stabilized base course layers where installed under runways, taxiways, aprons, or other paved areas, and not less than 18 inches (0.5 m) below finished grade where installed in unpaved areas.

Unless otherwise shown on the plans, duct banks under paved areas shall extend at least 3 feet (1 m) beyond the edges of the pavement or 3 feet (1 m) beyond any under drains that may be installed alongside the paved area. Trenches for duct banks shall be opened the complete length before concrete is placed so that if any obstructions are encountered, provisions can be made to avoid them. Unless otherwise shown on the plans, all duct banks shall be placed on a layer of concrete not less than 3 inches (75 mm) thick prior to its initial set. The Contractor shall space the conduits not less than 3 inches (75 mm) apart (measured from outside wall to outside wall). All such multiple conduits shall be placed using conduit spacers applicable to the type of conduit. As the conduit laying progresses, concrete shall be placed around and on top of the conduits not less than 3 inches (75 mm) thick unless otherwise shown on the plans. All conduits shall terminate with female ends for ease of access in current and future use. Install factory plugs in all unused ends. Do not cover the ends or plugs with concrete.

Conduits forming the duct bank shall be installed using conduit spacers. No. 4 reinforcing bars shall be driven vertically into the soil a minimum of 6 inches (150 mm) to anchor the assembly into the earth prior to placing the concrete encasement. For this purpose, the spacers shall be fastened down with locking collars attached to the vertical bars. Spacers shall be installed at 5-foot (1.5-m) intervals. Spacers shall be in the proper sizes and configurations to fit the conduits. Locking collars and spacers shall be submitted to the RPR for review prior to use.

When specified, the Contractor shall reinforce the bottom side and top of encasements with steel reinforcing mesh or fabric or other approved metal reinforcement. When directed, the Contractor shall supply additional supports where the ground is soft and boggy, where ducts cross under roadways, or where shown on the plans. Under such conditions, the complete duct structure shall be supported on reinforced concrete footings, piers, or piles located at approximately 5-foot (1.5-m) intervals.

All pavement surfaces that are to have ducts installed therein shall be neatly saw cut to form a vertical face. All excavation shall be included in the contract with price for the duct.

Install a plastic, detectable, color as noted, 3 to 6 inches (75 to 150 mm) wide tape, 8 inches (200 mm) minimum below grade above all underground conduit or duct lines not installed under pavement. Utilize the 3-inch (75-mm) wide tape only for single conduit runs. Utilize the 6-inch (150-mm) wide tape for multiple conduits and duct banks. For duct banks equal to or greater than 24 inches (600 mm) in width, utilize more than one tape for sufficient coverage and identification of the duct bank as required.

When existing cables are to be placed in split duct, encased in concrete, the cable shall be carefully located and exposed by hand tools. Prior to being placed in duct, the RPR shall be notified so that he may inspect the cable and determine that it is in good condition. Where required, split duct shall be installed as shown on the drawings or as required by the RPR.

110-3.3 Conduits without concrete encasement. Trenches for single-conduit lines shall be not less than 6 inches (150 mm) nor more than 12 inches (300 mm) wide. The trench for 2 or more conduits installed at the same level shall be proportionately wider. Trench bottoms for conduits without concrete encasement shall be made to conform accurately to grade so as to provide uniform support for the conduit along its entire length.

Unless otherwise shown on the plans, a layer of fine earth material, at least 4 inches (100 mm) thick (loose measurement) shall be placed in the bottom of the trench as bedding for the conduit. The bedding material shall consist of soft dirt, sand or other fine fill, and it shall contain no particles that would be retained on a 1/4-inch (6.3 mm) sieve. The bedding material shall be tamped until firm. Flowable backfill may alternatively be used.

Unless otherwise shown on plans, conduits shall be installed so that the tops of all conduits within the Airport's secured area where trespassing is prohibited are at least 18 inches (0.5 m) below the finished grade. Conduits outside the Airport's secured area shall be installed so that the tops of the conduits are at least 24 inches (60 cm) below the finished grade per National Electric Code (NEC), Table 300.5.

When two or more individual conduits intended to carry conductors of equivalent voltage insulation rating are installed in the same trench without concrete encasement, they shall be spaced not less than 3 inches (75 mm) apart (measured from outside wall to outside wall) in a horizontal direction and not less than 6 inches (150 mm) apart in a vertical direction. Where two or more individual conduits intended to carry conductors of differing voltage insulation rating are installed in the same trench without concrete encasement, they shall be placed not less than 3 inches (75 mm) apart (measured from outside wall to outside wall) in a horizontal direction and lot less than 6 inches (150 mm) apart in a vertical direction.

Trenches shall be opened the complete length between normal termination points before conduit is installed so that if any unforeseen obstructions are encountered, proper provisions can be made to avoid them.

Conduits shall be installed using conduit spacers. No. 4 reinforcing bars shall be driven vertically into the soil a minimum of 6 inches (150 mm) to anchor the assembly into the earth while backfilling. For this purpose, the spacers shall be fastened down with locking collars attached to the vertical bars. Spacers shall be installed at 5-foot (1.5-m) intervals. Spacers shall be in the proper sizes and configurations to fit the conduits. Locking collars and spacers shall be submitted to the RPR for review prior to use.

110-3.4 Markers. The location of each end and of each change of direction of conduits and duct banks shall be marked by a concrete slab marker 2 feet (60 cm) square and 4 - 6 inches (100 - 150 mm) thick extending approximately one inch (25 mm) above the surface. The markers shall also be located directly above the ends of all conduits or duct banks, except where they terminate in a junction/access structure or building. Each cable or duct run from a line of lights and signs to the equipment vault must be marked at approximately every 200 feet (61 m) along the cable or duct run, with an additional marker at each change of direction of cable or duct run.

The Contractor shall impress the word “DUCT” or “CONDUIT” on each marker slab. Impression of letters shall be done in a manner, approved by the RPR, for a neat, professional appearance. All letters and words must be neatly stenciled. After placement, all markers shall be given one coat of high-visibility orange paint, as approved by the RPR. The Contractor shall also impress on the slab the number and size of conduits beneath the marker along with all other necessary information as determined by the RPR. The letters shall be 4 inches (100 mm) high and 3 inches (75 mm) wide with width of stroke 1/2 inch (12 mm) and 1/4 inch (6 mm) deep or as large as the available space permits. Furnishing and installation of duct markers is incidental to the respective duct pay item.

110-3.5 Backfilling for conduits. For conduits, 8 inches (200 mm) of sand, soft earth, or other fine fill (loose measurement) shall be placed around the conduits ducts and carefully tamped around and over them with hand tampers. The remaining trench shall then be backfilled and compacted per Item P-152 except that material used for back fill shall be select material not larger than 4 inches (100 mm) in diameter.

Flowable backfill may alternatively be used.

Trenches shall not contain pools of water during back filling operations.

The trench shall be completely backfilled and tamped level with the adjacent surface; except that, where sod is to be placed over the trench, the backfilling shall be stopped at a depth equal to the thickness of the sod to be used, with proper allowance for settlement.

Any excess excavated material shall be removed and disposed of per instructions issued by the RPR.

110-3.6 Backfilling for duct banks. After the concrete has cured, the remaining trench shall be backfilled and compacted per Item P-152 “Excavation and Embankment” except that the material used for backfill shall be select material not larger than 4 inches (100 mm) in diameter. In addition to the requirements of Item P-152, where duct banks are installed under pavement, one moisture/density test per

lift shall be made for each 250 linear feet (76 m) of duct bank or one work period's construction, whichever is less.

Flowable backfill may alternatively be used.

Trenches shall not contain pools of water during backfilling operations.

The trench shall be completely backfilled and tamped level with the adjacent surface; except that, where sod is to be placed over the trench, the backfilling shall be stopped at a depth equal to the thickness of the sod to be used, with proper allowance for settlement.

Any excess excavated material shall be removed and disposed of per instructions issued by the RPR.

110-3.7 Restoration. Where sod has been removed, it shall be replaced as soon as possible after the backfilling is completed. All areas disturbed by the work shall be restored to its original condition. The restoration shall include sodding shown on the plans. The Contractor shall be held responsible for maintaining all disturbed surfaces and replacements until final acceptance. All restoration shall be considered incidental to the respective L-110 pay item. Following restoration of all trenching near airport movement surfaces, the Contractor shall thoroughly visually inspect the area for foreign object debris (FOD) and remove any such FOD that is found. This FOD inspection and removal shall be considered incidental to the pay item of which it is a component part.

110-3.8 Ownership of removed cable. The Contractor is to take possession of the removed cable and dispose of off-site.

METHOD OF MEASUREMENT

110-4.1 Underground conduits and duct banks shall be measured by the linear feet (meter) of conduits and duct banks installed, including encasement, locator tape, trenching and backfill with designated material, and restoration, and for drain lines, the termination at the drainage structure, all measured in place, completed, and accepted. Separate measurement shall be made for the various types and sizes.

BASIS OF PAYMENT

110-5.1 Payment will be made at the contract unit price per linear foot for each type and size of conduit and duct bank completed and accepted, including trench and backfill with the designated material, and, for drain lines, the termination at the drainage structure. This price shall be full compensation for removal and disposal of existing duct banks and conduits as shown on the plans, furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete this item per the provisions and intent of the plans and specifications.

Payment will be made under:

Item L-110-5.1	One 2" schedule 40 PVC conduit non-encased direct buried in earth, 24-inch minimum cover, complete in place. Includes conduits, connectors, warning tape, excavation, labor, backfill and etc., complete in place. – Price per linear foot
Item L-110-5.2	One 2" schedule 40 PVC conduit concrete encased installed in new full strength pavement, 24-inch minimum cover, complete in place. Includes conduits, connectors, saw cutting, excavation, warning tape, concrete, labor, backfill and etc., complete in place. – Price per linear foot

Item L-110-5.3	One 2" schedule 40 PVC conduit concrete encased installed in existing full strength pavement, 24-inch minimum cover, complete in place. Includes conduits, connectors, saw cutting, excavation, warning tape, concrete, labor, backfill and etc., complete in place. – Price per linear foot
Item L-110-5.4	Intercept existing conduit system and connect to new conduit system. Includes excavation, chipping back of concrete encasement, sawcutting, backfill, sod/pavement restoration, concrete, labor and etc., complete in place. – Price per each
Item L-110-5.5	Hand excavate and concrete encase existing 1W2” conduit, complete. Includes hand excavation of conduits, concrete, warning tape, backfill, sod restoration, labor, dewatering and etc. complete in place. – Price per linear foot

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

Advisory Circular (AC)

AC 150/5340-30	Design and Installation Details for Airport Visual Aids
AC 150/5345-53	Airport Lighting Equipment Certification Program

ASTM International (ASTM)

ASTM A615	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement

National Fire Protection Association (NFPA)

NFPA-70	National Electrical Code (NEC)

Underwriters Laboratories (UL)

UL Standard 6	Electrical Rigid Metal Conduit - Steel
UL Standard 514B	Conduit, Tubing, and Cable Fittings
UL Standard 514C	Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
UL Standard 1242	Electrical Intermediate Metal Conduit Steel
UL Standard 651	Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings
UL Standard 651A	Type EB and A Rigid PVC Conduit and HDPE Conduit

END OF ITEM L-110

ITEM L-115 ELECTRICAL MANHOLES AND JUNCTION STRUCTURES

DESCRIPTION

115-1.1 This item shall consist of electrical manholes and junction structures (hand holes, pull boxes, junction cans, etc.) installed per this specification, at the indicated locations and conforming to the lines, grades and dimensions shown on the plans or as required by the RPR. This item shall include the installation of each electrical manhole and/or junction structures with all associated excavation, backfilling, sheeting and bracing, concrete, reinforcing steel, ladders, appurtenances, testing, dewatering and restoration of surfaces to the satisfaction of the RPR including removal of existing manholes and junction structures as shown on the plans.

EQUIPMENT AND MATERIALS

115-2.1 General.

a. All equipment and materials covered by referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when so requested by the RPR Engineer.

b. Manufacturer's certifications shall not relieve the Contractor of the responsibility to provide materials per these specifications. Materials supplied and/or installed that do not comply with these specifications shall be removed (when directed by the RPR) and replaced with materials that comply with these specifications at the Contractor's cost.

c. All materials and equipment used to construct this item shall be submitted to the RPR for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify products or models applicable to this project. Indicate all optional equipment and delete any non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment to which they apply on each submittal sheet. Markings shall be made bold and clear with arrows or circles (highlighting is not acceptable). The Contractor is solely responsible for delays in the project that may accrue directly or indirectly from late submissions or resubmissions of submittals.

d. The data submitted shall be sufficient, in the opinion of the RPR, to determine compliance with the plans and specifications. The Contractor's submittals shall be electronically submitted in pdf format, tabbed by specification section. The RPR reserves the right to reject any and all equipment, materials or procedures that do not meet the system design and the standards and codes, specified in this document.

e. All equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for a period of at least twelve (12) months from the date of final acceptance by the Owner. The defective materials and/or equipment shall be repaired or replaced, at the Owner's discretion, with no additional cost to the Owner.

115-2.2 Concrete structures. Concrete shall be proportioned, placed, and cured per Item P-610, Concrete for Miscellaneous Structures. Cast-in-place concrete structures shall be as shown on the plans.

115-2.3 Precast concrete structures. Precast concrete structures shall be furnished by a plant meeting National Precast Concrete Association Plant Certification Program or another engineer approved third party certification program. Provide precast concrete structures where shown on the plans.

Precast concrete structures shall be an approved standard design of the manufacturer. Precast units shall have mortar or bitumastic sealer placed between all joints to make them watertight. The structure shall be designed to withstand 100,000 lb aircraft loads**,** unless otherwise shown on the plans. Openings or knockouts shall be provided in the structure as detailed on the plans.

Threaded inserts and pulling eyes shall be cast in as shown on the plans.

If the Contractor chooses to propose a different structural design, signed and sealed shop drawings design calculations, and other information requested by the RPR shall be submitted by the Contractor to allow for a full evaluation by the RPR. The RPR shall review per the process defined in the General Provisions.

115-2.4 Junction boxes. Junction boxes shall be L-867 Class 1 (non-load bearing) or L-868 Class 1 (load bearing) airport light bases that are encased in concrete. The light bases shall have a L-894 blank cover, gasket, and stainless-steel hardware. All bolts, studs, nuts, lock washers, and other similar fasteners used for the light fixture assemblies must be fabricated from 316L (equivalent to EN 1.4404), 18-8, 410, or 416 stainless steel. If 18-8, 410, or 416 stainless steel is utilized it shall be passivated and be free from any discoloration. Covers shall be 3/8-inch (9-mm) thickness for L-867 and 3/4-inch (19-mm) thickness for L-868. All junction boxes shall be provided with both internal and external ground lugs.

115-2.5 Mortar. The mortar shall be composed of one part of cement and two parts of mortar sand, by volume. The cement shall be per the requirements in ASTM C150, Type I. The sand shall be per the requirements in ASTM C144. Hydrated lime may be added to the mixture of sand and cement in an amount not to exceed 15% of the weight of cement used. The hydrated lime shall meet the requirements of ASTM C206. Water shall be potable, reasonably clean and free of oil, salt, acid, alkali, sugar, vegetable, or other substances injurious to the finished product.

115-2.6 Concrete. All concrete used in structures shall conform to the requirements of Item P-610, Concrete for Miscellaneous Structures.

115-2.7 Frames and covers. The frames shall conform to one of the following requirements:

a. ASTM A48 Gray iron castings

b. ASTM A47 Malleable iron castings

c. ASTM A27 Steel castings

d. ASTM A283, Grade D Structural steel for grates and frames

e. ASTM A536 Ductile iron castings

f. ASTM A897 Austempered ductile iron castings

All castings specified shall withstand a maximum tire pressure of 250 psi and maximum load of 300,000 pounds.

All castings or structural steel units shall conform to the dimensions shown on the plans and shall be designed to support the loadings specified.

Each frame and cover unit shall be provided with fastening members to prevent it from being dislodged by traffic, but which will allow easy removal for access to the structure.

All castings shall be thoroughly cleaned. After fabrication, structural steel units shall be galvanized to meet the requirements of ASTM A123.

Each cover shall have the word “ELECTRIC” or other approved designation cast on it. Each frame and cover shall be as shown on the plans or approved equivalent. No cable notches are required.

Each manhole shall be provided with a “DANGER -- PERMIT-REQUIRED CONFINED SPACE, DO NOT ENTER” safety warning sign as detailed in the Contract Documents and in accordance with OSHA 1910.146 (c)(2).

115-2.8 Ladders. Ladders, if specified, shall be galvanized steel or as shown on the plans.

115-2.9 Reinforcing steel. All reinforcing steel shall be deformed bars of new billet steel meeting the requirements of ASTM A615, Grade 60.

115-2.10 Bedding/special backfill. Bedding or special backfill shall be as shown on the plans.

115-2.11 Flowable backfill. Flowable material used to backfill shall conform to the requirements of Item P-153, Controlled Low Strength Material.

115-2.12 Cable trays. Cable trays shall be plastic**.** Cable trays shall be located as shown on the plans.

115-2.13 Plastic conduit. Plastic conduit shall comply with Item L-110, Airport Underground Electrical Duct Banks and Conduits.

115-2.14 Conduit terminators. Conduit terminators shall be pre-manufactured for the specific purpose and sized as required or as shown on the plans.

115-2.15 Pulling-in irons. Pulling-in irons shall be manufactured with 7/8-inch (22 mm) diameter hot-dipped galvanized steel or stress-relieved carbon steel roping designed for concrete applications (7 strand, 1/2-inch (12 mm) diameter with an ultimate strength of 270,000 psi (1862 MPa)). Where stress-relieved carbon steel roping is used, a rustproof sleeve shall be installed at the hooking point and all exposed surfaces shall be encapsulated with a polyester coating to prevent corrosion.

115-2.16 Ground rods. Ground rods shall be one piece, copper clad steel**.** The ground rods shall be of the length and diameter specified on the plans, but in no case shall they be less than 8 feet (2.4 m) long nor less than 5/8 inch (16 mm) in diameter.

CONSTRUCTION METHODS

115-3.1 Unclassified excavation. It is the Contractor’s responsibility to locate existing utilities within the work area prior to excavation. Damage to utility lines, through lack of care in excavating, shall be repaired or replaced to the satisfaction of the RPR without additional expense to the Owner.

The Contractor shall perform excavation for structures and structure footings to the lines and grades or elevations shown on the plans or as staked by the RPR. The excavation shall be of sufficient size to permit the placing of the full width and length of the structure or structure footings shown.

All excavation shall be unclassified and shall be considered incidental to Item L-115. Dewatering necessary for structure installation and erosion per federal, state, and local requirements is incidental to Item L-115.

Boulders, logs and all other objectionable material encountered in excavation shall be removed. All rock and other hard foundation material shall be cleaned of all loose material and cut to a firm surface either level, stepped or serrated, as directed by the RPR. All seams, crevices, disintegrated rock and thin strata shall be removed. When concrete is to rest on a surface other than rock, special care shall be taken not to disturb the bottom of the excavation. Excavation to final grade shall not be made until just before the concrete or reinforcing is to be placed.

The Contractor shall provide all bracing, sheeting and shoring necessary to implement and protect the excavation and the structure as required for safety or conformance to governing laws. The cost of bracing, sheeting and shoring shall be included in the unit price bid for the structure.

Unless otherwise provided, bracing, sheeting and shoring involved in the construction of this item shall be removed by the Contractor after the completion of the structure. Removal shall be effected in a manner that will not disturb or mar finished masonry. The cost of removal shall be included in the unit price bid for the structure.

After each excavation is completed, the Contractor shall notify the RPR. Structures shall be placed after the RPR has approved the depth of the excavation and the suitability of the foundation material.

Prior to installation the Contractor shall provide a minimum of 6 inches (150 mm) of sand or a material approved by the RPR as a suitable base to receive the structure. The base material shall be compacted and graded level and at proper elevation to receive the structure in proper relation to the conduit grade or ground cover requirements, as indicated on the plans.

115-3.2 Concrete structures. Concrete structures shall be built on prepared foundations conforming to the dimensions and form indicated on the plans. The concrete and construction methods shall conform to the requirements specified in Item P-610. Any reinforcement required shall be placed as indicated on the plans and shall be approved by the RPR before the concrete is placed.

115-3.3 Precast unit installations. Precast units shall be installed plumb and true. Joints shall be made watertight by use of sealant at each tongue-and-groove joint and at roof of manhole. Excess sealant shall be removed and severe surface projections on exterior of neck shall be removed.

115-3.4 Placement and treatment of castings, frames and fittings. All castings, frames and fittings shall be placed in the positions indicated on the Plans or as directed by the RPR and shall be set true to line and to correct elevation. If frames or fittings are to be set in concrete or cement mortar, all anchors or bolts shall be in place and position before the concrete or mortar is placed. The unit shall not be disturbed until the mortar or concrete has set.

Field connections shall be made with bolts, unless indicated otherwise. Welding will not be permitted unless shown otherwise on the approved shop drawings and written approval is granted by the casting manufacturer. Erection equipment shall be suitable and safe for the workman. Errors in shop fabrication or deformation resulting from handling and transportation that prevent the proper assembly and fitting of parts shall be reported immediately to the RPR and approval of the method of correction shall be obtained. Approved corrections shall be made at Contractor’s expense.

Anchor bolts and anchors shall be properly located and built into connection work. Bolts and anchors shall be preset by the use of templates or such other methods as may be required to locate the anchors and anchor bolts accurately.

Pulling-in irons shall be located opposite all conduit entrances into structures to provide a strong, convenient attachment for pulling-in blocks when installing cables. Pulling-in irons shall be set directly into the concrete walls of the structure.

115-3.5 Installation of ladders. Ladders shall be installed such that they may be removed if necessary. Mounting brackets shall be supplied top and bottom and shall be cast in place during fabrication of the structure or drilled and grouted in place after erection of the structure.

115-3.6 Removal of sheeting and bracing. In general, all sheeting and bracing used to support the sides of trenches or other open excavations shall be withdrawn as the trenches or other open excavations are being refilled. That portion of the sheeting extending below the top of a structure shall be withdrawn, unless otherwise directed, before more than 6 inches (150 mm) of material is placed above the top of the structure and before any bracing is removed. Voids left by the sheeting shall be carefully refilled with

selected material and rammed tight with tools especially adapted for the purpose or otherwise as may be approved.

The RPR may direct the Contractor to delay the removal of sheeting and bracing if, in his judgment, the installed work has not attained the necessary strength to permit placing of backfill.

115-3.7 Backfilling. After a structure has been completed, the area around it shall be backfilled in horizontal layers not to exceed 6 inches (150 mm) in thickness measured after compaction to the density requirements in Item P-152. Each layer shall be deposited all around the structure to approximately the same elevation. The top of the fill shall meet the elevation shown on the plans or as directed by the RPR.

Backfill shall not be placed against any structure until approval is given by the RPR. In the case of concrete, such approval shall not be given until tests made by the laboratory under supervision of the RPR establish that the concrete has attained sufficient strength to provide a factor of safety against damage or strain in withstanding any pressure created by the backfill or the methods used in placing it.

Where required, the RPR may direct the Contractor to add, at his own expense, sufficient water during compaction to assure a complete consolidation of the backfill. The Contractor shall be responsible for all damage or injury done to conduits, duct banks, structures, property or persons due to improper placing or compacting of backfill.

115-3.8 Connection of duct banks. To relieve stress of joint between concrete-encased duct banks and structure walls, reinforcement rods shall be placed in the structure wall and shall be formed and tied into duct bank reinforcement at the time the duct bank is installed.

115-3.9 Grounding. A ground rod shall be installed in the floor of all concrete structures so that the top of rod extends 6 inches (150 mm) above the floor. The ground rod shall be installed within one foot (30 cm) of a corner of the concrete structure. Ground rods shall be installed prior to casting the bottom slab. Where the soil condition does not permit driving the ground rod into the earth without damage to the ground rod, the Contractor shall drill a 4-inch (100 mm) diameter hole into the earth to receive the ground rod. The hole around the ground rod shall be filled throughout its length, below slab, with Portland cement grout. Ground rods shall be installed in precast bottom slab of structures by drilling a hole through bottom slab and installing the ground rod. Bottom slab penetration shall be sealed watertight with Portland cement grout around the ground rod.

A grounding bus of 4/0 bare stranded copper shall be exothermically bonded to the ground rod and loop the concrete structure walls. The ground bus shall be a minimum of one foot (30 cm) above the floor of the structure and separate from other cables. No. 2 American wire gauge (AWG) bare copper pigtails shall bond the grounding bus to all cable trays and other metal hardware within the concrete structure. Connections to the grounding bus shall be exothermic. If an exothermic weld is not possible, connections to the grounding bus shall be made by using connectors approved for direct burial in soil or concrete per UL 467. Hardware connections may be mechanical, using a lug designed for that purpose.

115-3.10 Cleanup and repair. After erection of all galvanized items, damaged areas shall be repaired by applying a liquid cold-galvanizing compound per MIL-P-21035. Surfaces shall be prepared and compound applied per the manufacturer’s recommendations.

Prior to acceptance, the entire structure shall be cleaned of all dirt and debris.

115-3.11 Restoration. After the backfill is completed, the Contractor shall dispose of all surplus material, dirt and rubbish from the site. The Contractor shall restore all disturbed areas equivalent to or better than their original condition. All sodding, grading and restoration shall be considered incidental to the respective Item L-115 pay item.

The Contractor shall grade around structures as required to provide positive drainage away from the structure.

Areas with special surface treatment, such as roads, sidewalks, or other paved areas shall have backfill compacted to match surrounding areas, and surfaces shall be repaired using materials comparable to original materials.

Following restoration of all trenching near airport movement surfaces, the Contractor shall thoroughly visually inspect the area for foreign object debris (FOD), and remove any such FOD that is found. This FOD inspection and removal shall be considered incidental to the pay item of which it is a component part.

After all work is completed, the Contractor shall remove all tools and other equipment, leaving the entire site free, clear and in good condition.

115-3.12 Inspection. Prior to final approval, the electrical structures shall be thoroughly inspected for conformance with the plans and this specification. Any indication of defects in materials or workmanship shall be further investigated and corrected. The earth resistance to ground of each ground rod shall not exceed 25 ohms. Each ground rod shall be tested using the fall-of-potential ground impedance test per American National Standards Institute / Institute of Electrical and Electronic Engineers (ANSI/IEEE) Standard 81. This test shall be performed prior to establishing connections to other ground electrodes.

115-3.13 Manhole elevation adjustments. The Contractor shall adjust the tops of existing manholes in areas designated in the Contract Documents to the new elevations shown. The Contractor shall be responsible for determining the exact height adjustment required to raise or lower the top of each manhole to the new elevations. The existing top elevation of each manhole to be adjusted shall be determined in the field and subtracted/added from the proposed top elevation.

The Contractor shall remove/extend the existing top section or ring and cover on the manhole structure or manhole access. The Contractor shall install precast concrete sections or grade rings of the required dimensions to adjust the manhole top to the new proposed elevation or shall cut the existing manhole walls to shorten the existing structure, as required by final grades. The Contractor shall reinstall the manhole top section or ring and cover on top and check the new top elevation.

The Contractor shall construct a concrete slab around the top of adjusted structures located in graded areas that are not to be paved. The concrete slab shall conform to the dimensions shown on the plans.

115-3.14 Duct extension to existing ducts. Where existing concrete encased ducts are to be extended, the duct extension shall be concrete encased plastic conduit. The fittings to connect the ducts together shall be standard manufactured connectors designed and approved for the purpose. The duct extensions shall be installed according to the concrete encased duct detail and as shown on the plans.

METHOD OF MEASUREMENT

115-4.1 Electrical manholes and junction structures shall be measured by each unit completed in place and accepted. The following items shall be included in the price of each unit: All required excavation and dewatering:; sheeting and bracing; all required backfilling with on-site materials; restoration of all surfaces and finished grading and turfing; all required connections; temporary cables and connections; and ground rod testing

115-4.2 Manhole elevation adjustments shall be measured by the completed unit installed, in place, completed, and accepted. Separate measurement shall not be made for the various types and sizes.

BASIS OF PAYMENT

115-5.1 The accepted quantity of electrical manholes and junction structures will be paid for at the Contract unit price per each, complete and in place. This price shall be full compensation for furnishing

all materials and for all preparation, excavation, backfilling and placing of the materials, furnishing and installation of appurtenances and connections to duct banks and other structures as may be required to complete the item as shown on the plans and for all labor, equipment, tools and incidentals necessary to complete the structure.

115-5.2 Payment shall be made at the contract unit price for manhole elevation adjustments. This price shall be full compensation for furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary, including but not limited to, spacers, concrete, rebar, dewatering, excavating, backfill, topsoil, sodding and pavement restoration, where required, to complete this item as shown in the plans and to the satisfaction of the RPR.

Payment will be made under:

Item L-115-5.1	L-867 16" diameter junction can with cover installed in earth. Includes excavation, 16" diameter L-867 base can, concrete, steel cover, carbon steel coated bolts, identification, connector kits, grounding, ground rods, safety grounds, identification, testing, labor, rock, backfill and etc., complete in place. – Price per each
Item L-115-5.2	L-867 16" diameter bottomless 2 can junction can plaza installed in earth. Includes excavation, 2-16" diameter L-867 base cans, concrete, steel covers, carbon steel coated bolts, identification, connector kits, grounding, ground rods, safety grounds, identification, testing, labor, rock, backfill and etc. complete in place. – Price per each
Item L-115-5.3	L-867 16" diameter bottomless 4 can junction can plaza installed in earth. Includes excavation, 4-16" diameter L-867 base cans, concrete, steel covers, carbon steel coated bolts, identification, connector kits, grounding, ground rods, safety grounds, identification, testing, labor, rock, backfill and etc. complete in place. – Price per each
Item L-115-5.4	Intercept existing light base can in earth and connect to conduit system. Includes sawcutting, excavation, core drilling, can repair, backfill, concrete, sod/pavement restoration, dewatering, labor and etc., complete in place. – Price per each
Item L-115-5.5	Removal of existing junction can/light base can in earth/existing pavement, complete. Includes backfill, labor, concrete, saw cutting, disposal, coring of pavement, removal of base can, connector kits, disconnection of existing circuit, removal of circuit conductors, reconnection of existing circuit, reconnection of existing conduits, conduits, temporary conduits and conductors, sod/pavement restoration and etc. complete in place. – Price per each
Item L-115-5.6	Removal of existing 2 can junction can plaza, complete. Includes excavation, backfill, labor, sawcutting, disposal, disconnection of existing circuits, removal of circuit conductors, reconnection of existing circuits, temporary wiring, capping of conduits, sod/pavement restoration, dewatering and etc. complete in place. – Price per each

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

American National Standards Institute / Insulated Cable Engineers Association (ANSI/ICEA)

ANSI/IEEE STD 81	IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System

Advisory Circular (AC)

AC 150/5345-7	Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits
AC 150/5345-26	Specification for L-823 Plug and Receptacle, Cable Connectors
AC 150/5345-42	Specification for Airport Light Bases, Transformer Housings, Junction Boxes, and Accessories
AC 150/5340-30	Design and Installation Details for Airport Visual Aids
AC 150/5345-53	Airport Lighting Equipment Certification Program

Commercial Item Description (CID)

A-A 59544	Cable and Wire, Electrical (Power, Fixed Installation)

ASTM International (ASTM)

ASTM A27	Standard Specification for Steel Castings, Carbon, for General Application
ASTM A47	Standard Specification for Ferritic Malleable Iron Castings
ASTM A48	Standard Specification for Gray Iron Castings
ASTM A123	Standard Specification for Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products
ASTM A283	Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates
ASTM A536	Standard Specification for Ductile Iron Castings
ASTM A615	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A897	Standard Specification for Austempered Ductile Iron Castings
ASTM C144	Standard Specification for Aggregate for Masonry Mortar
ASTM C150	Standard Specification for Portland Cement
ASTM C206	Standard Specification for Finishing Hydrated Lime

FAA Engineering Brief (EB)

EB #83	In Pavement Light Fixture Bolts

Mil Spec

MIL-P-21035	Paint High Zinc Dust Content, Galvanizing Repair

National Fire Protection Association (NFPA)

NFPA-70 National Electrical Code (NEC)

END OF ITEM L-115

ITEM L-125 INSTALLATION OF AIRPORT LIGHTING SYSTEMS

DESCRIPTION

125-1.1 This item shall consist of airport lighting systems furnished**,** and installed in accordance with this specification, the referenced specifications, and the applicable advisory circulars (ACs). The systems shall be installed at the locations and in accordance with the dimensions, design, and details shown in the plans. This item shall include the furnishing of all equipment, materials, services, and incidentals necessary to place the systems in operation as completed units to the satisfaction of the RPR.

EQUIPMENT AND MATERIALS

125-2.1 General.

a. Airport lighting equipment and materials covered by Federal Aviation Administration (FAA) specifications shall be certified under the Airport Lighting Equipment Certification Program in accordance with AC 150/5345-53, current version. FAA certified airfield lighting shall be compatible with each other to perform in compliance with FAA criteria and the intended operation. If the Contractor provides equipment that does not performs as intended because of incompatibility with the system, the Contractor assumes all costs to correct the system for to operate properly.

b. Manufacturer's certifications shall not relieve the Contractor of their responsibility to provide materials in accordance with these specifications and acceptable to the RPR. Materials supplied and/or installed that do not comply with these specifications shall be removed, when directed by the RPR and replaced with materials, which do comply with these specifications, at the sole cost of the Contractor.

c. All materials and equipment used shall be submitted to the RPR for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Clearly mark each copy to identify pertinent products or models applicable to this project. Indicate all optional equipment and delete non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment for which they apply on each submittal sheet. Markings shall be clearly made with arrows or circles (highlighting is not acceptable). The Contractor shall be responsible for delays in the project accruing directly or indirectly from late submissions or resubmissions of submittals.

d. The data submitted shall be sufficient, in the opinion of the RPR, to determine compliance with the plans and specifications. The Contractor's submittals shall be submitted in electronic PDF format, tabbed by specification section**.** The RPR reserves the right to reject any or all equipment, materials or procedures, which, in the RPR’s opinion, does not meet the system design and the standards and codes, specified herein.

e. All equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for a period of at least twelve (12) months from final acceptance by the Owner. The defective materials and/or equipment shall be repaired or replaced, at the Owner's discretion, with no additional cost to the Owner. All LED light fixtures, with the exception of obstruction lighting (AC 150/5345-43) must be warranted by the manufacturer for a minimum of 4 years after date of installation inclusive of all electronics. Obstruction lighting warranty is set by the individual manufacturer.

EQUIPMENT AND MATERIALS

125-2.2 Conduit/Duct. Conduit shall conform to Specification Item L-110 Airport Underground Electrical Duct Banks and Conduits.

125-2.3 Cable and counterpoise. Cable and Counterpoise shall conform to Item L-108 Underground Power Cable for Airports.

125-2.4 Tape. Rubber and plastic electrical tapes shall be Scotch Electrical Tape Numbers 23 and 88 respectively, as manufactured by 3M Company or an approved equal.

125-2.5 Cable connections. Cable Connections shall conform to Item L-108 Installation of Underground Cable for Airports.

125-2.6 Retroreflective markers. Not required.

125-2.7 Runway and taxiway lights. Runway and taxiway lights shall conform to the requirements of AC 150/5345-46. Lamps shall be of size and type indicated, or as required by fixture manufacturer for each lighting fixture required under this contract. Filters shall be of colors conforming to the specification for the light concerned or to the standard referenced.

Lights

Type	Class	Mode	Style	Option	Base	Filter	Transformer	Basis of Design CCR Loads	Notes (light source and height)
L-861T(L)	2	1	N/A	4 (Base Mounted)	See Plans	Blue	Per Manufacturer	15VA	Taxiway Edge Light (LED and 14” high)

125-2.8 Runway and taxiway signs. Runway and Taxiway Guidance Signs should conform to the requirements of AC 150/5345-44.

Type	Size	Style	Class	Mode	Basis of Design CCR Loads	Notes
L-858Y, R, L, C	1	2, 3	1	2	90VA	1 module/1-2 characters
					95VA	2 module/3-4 characters
					100VA	3 module/5-6 characters
					100VA	4 module/7-8 characters

125-2.9 Runway end identifier light (REIL). Not required

125-2.10 Precision approach path indicator (PAPI). Not required

125-2.11 Circuit Selector Cabinet. The circuit selector cabinet shall meet the requirements of AC 150/5345-5, Type L-847, four circuit control, Class B, outdoor, Rating 1 (6.6 amperes).

125-2.12 Light base and transformer housings. Light Base and Transformer Housings should conform to the requirements of AC 150/5345-42. Light bases shall be Type L-867 and L-868, Class 1A, Size B and C shall be provided as indicated or as required to accommodate the fixture or device installed thereon. Base plates, cover plates, and adapter plates shall be provided to accommodate various sizes of fixtures.

125-2.13 Isolation transformers. Isolation Transformers shall be Type L-830, size as required for each

installation. Transformer shall conform to AC 150/5345-47.

INSTALLATION

125-3.1 Installation. The Contractor shall furnish, install, connect and test all equipment, accessories, conduit, cables, wires, buses, grounds and support items necessary to ensure a complete and operable airport lighting system as specified here and shown in the plans.

The equipment installation and mounting shall comply with the requirements of the National Electrical Code and state and local code agencies having jurisdiction.

The Contractor shall install the specified equipment in accordance with the applicable advisory circulars and the details shown on the plans.

A slack of 3 ft (0.9 m), minimum, must be provided in the primary cable at each transformer/connector termination.

Plastic lighting fixture components, such as lamp heads, stems, frangible couplings, base covers, brackets, stakes, are not acceptable.

The tolerance for the height of runway/taxiway edge lights must be ±1 inch (25 mm). For stake-mounted lights, the specified lighting fixture height must be measured between the top of the stake and the top of the lens. For base-mounted lights, the specified lighting fixture height must be measured between the top of the base flange and the top of the lens, and includes the base cover, the frangible coupling, the stem, the lamp housing and the lens.

Cable/splice/duct markers must be pre-cast concrete of the size shown on plans. Letters/numbers/arrows for the legend to be impressed into the tops of the markers must be pre-assembled and secured in the mold before the concrete is poured. Legends inscribed by hand in wet concrete are not acceptable.

Stencil horizontal and vertical aiming angles on each REIL flash head or equipment enclosure. The numerals must be black and one inch (25 mm) minimum height.

Stencil vertical aiming angles on the outside of each PAPI lamp housing. The numerals must be black and one inch (25 mm) minimum height.

Apply a corrosion inhibiting, anti-seize compound to all screws, nuts and frangible coupling threads. If coated bolts are used per EB #83, do not apply anti-seize compound.

125-3.2 Testing. All lights shall be fully tested by continuous operation for not less than 24 hours as a completed system prior to acceptance. The test shall include operating the constant current regulator in each step not less than 10 times at the beginning and end of the 24-hour test. The fixtures shall illuminate properly during each portion of the test.

125-3.3 Shipping and storage. Equipment shall be shipped in suitable packing material to prevent damage during shipping. Store and maintain equipment and materials in areas protected from weather and physical damage. Any equipment and materials, in the opinion of the RPR, damaged during construction or storage shall be replaced by the Contractor at no additional cost to the owner. Painted or galvanized surfaces that are damaged shall be repaired in accordance with the manufacturer's recommendations.

125-3.4 Elevated and in-pavement lights. Water, debris, and other foreign substances shall be removed prior to installing fixture base and light.

A jig or holding device shall be used when installing each light fixture to ensure positioning to the proper elevation, alignment, level control, and azimuth control. Light fixtures shall be oriented with the light beams parallel to the runway or taxiway centerline and facing in the required direction. The outermost

edge of fixture shall be level with the surrounding pavement. Surplus sealant or flexible embedding material shall be removed. The holding device shall remain in place until sealant has reached its initial set.

METHOD OF MEASUREMENT

125-4.1 Reflective markers will be measured by the number installed as completed units in place, ready for operation, and accepted by the RPR. Runway and taxiway lights will be measured by the number of each type installed as completed units in place, ready for operation, and accepted by the RPR. Guidance signs will be measured by the number of each type and size installed as completed units, in place, ready for operation, and accepted by the RPR. Runway End Identifier Lights shall be measured by each system installed as a completed unit in place, ready for operation, and accepted by the RPR.

Precision Approach Path Indicator shall be measured by each system installed as a completed unit, in place, ready for operation, and accepted by the RPR. Abbreviated Precision Approach Path Indicator shall be measured by each system installed as a completed unit, in place, ready for operation, and accepted by the RPR.

BASIS OF PAYMENT

125-5.1 Payment will be made at the Contract unit price for each complete runway or taxiway light, guidance sign, reflective marker, runway end identification light, precision approach path indicator, or abbreviated precision approach path indicator installed by the Contractor and accepted by the RPR. This payment will be full compensation for furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete this item.

Payment will be made under:

Item L-125-5.1	New L-861T(L), LED taxiway elevated edge light and new base can installed in earth. Includes excavation, fixture, L-867 base can, concrete, conduit, carbon steel coated bolts, backfill, grounding, ground rods, safety ground, circuit identification, transformer, rock, labor, testing, and etc. complete in place. – Price per each
Item L-125-5.2	New L-861T(L), LED taxiway elevated edge light installed on existing base can. Includes removal and disposal of existing transformer/cables/fixture, drilling and tapping, fixture, carbon steel coated bolts, safety ground, circuit identification, transformer, labor, testing and etc. complete in place. – Price per each
Item L-125-5.3	Removal of existing guidance sign and concrete base in earth/existing pavement, complete. Includes backfill, saw cutting, sod, disposal, connector kits, disconnection and removal of existing circuit conductors, reconnection of existing circuit, capping of conduits, temporary conduit and conductors, labor and etc., complete in place. – Price per each
Item L-125-5.4	New L-858(L), size 1, 3-4 characters LED guidance sign and concrete base installed in earth. Includes excavation, concrete, WWF/rebar, junction can, steel cover, tethers, sign panels, sign, LED light bars, LED

Drivers, on/off switch, transformer, hardware, carbon steel bolts, anchor bolts, conduits, conductors, counterpoise, grounding, testing, wiring, connector kits, backfill, sod restoration, identification, labor and etc. for a complete working system in place. – Price per each

Item L-125-5.5 New L-858(L), size 1, 5-6 characters LED guidance sign and concrete base installed in earth. Includes excavation, concrete, WWF/rebar, junction can, steel cover, tethers, sign panels, sign, LED light bars, LED Drivers, on/off switch, transformer, hardware, carbon steel bolts, anchor bolts, conduits, conductors, counterpoise, grounding, testing, wiring, connector kits, backfill, sod restoration, identification, labor and etc. for a complete working system in place. – Price per each

Item L-125-5.6 Intercept existing circuit conductors in existing base can/ manhole /junction can and extend circuits accordingly. Includes dewatering, identification, connector kits, labor, and etc. complete in place. – Price per each

Item L-125-5.7 Identification of cables, ductbanks and lighting fixtures per FAA specifications. Includes concrete duct markers, removal of existing bronze markers and cable tags, new bronze marker and cable tags, removal of existing circuit conductors, dewatering, labor and etc., complete in place. – Price per lump sum

Item L-125-5.8 Contractor coordination of Allowance account line item. Includes coordination with ALCMS manufacturer, escorting manufacturer, installation of ALCMS equipment, testing, coordination, labor and etc. for a complete working system in place. - Price Per Lump Sum.

Item L-125-5.9 Allowance Account: Modify existing Airfield Lighting Control System, complete. Includes updating of touchscreen graphics and control strategies, shop drawings, coordination, travel and expenses, testing, training, labor, taxes and etc. for a complete working system in place. – Allowance

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

Advisory Circulars (AC)

AC 150/5340-18	Standards for Airport Sign Systems
AC 150/5340-26	Maintenance of Airport Visual Aid Facilities
AC 150/5340-30	Design and Installation Details for Airport Visual Aids
AC 150/5345-5	Circuit Selector Switch
AC 150/5345-7	Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits

AC 150/5345-26	Specification for L-823 Plug and Receptacle, Cable Connectors
AC 150/5345-28	Precision Approach Path Indicator (PAPI) Systems
AC 150/5345-39	Specification for L-853, Runway and Taxiway Retroreflective Markers
AC 150/5345-42	Specification for Airport Light Bases, Transformer Housings, Junction Boxes, and Accessories
AC 150/5345-44	Specification for Runway and Taxiway Signs
AC 150/5345-46	Specification for Runway and Taxiway Light Fixtures
AC 150/5345-47	Specification for Series to Series Isolation Transformers for Airport Lighting Systems
AC 150/5345-51	Specification for Discharge-Type Flashing Light Equipment
AC 150/5345-53	Airport Lighting Equipment Certification Program
Engineering Brief (EB)	
EB No. 67	Light Sources Other than Incandescent and Xenon for Airport and Obstruction Lighting Fixtures

END OF ITEM L-125

CIVIL DRAWING INDEX

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CITY OF FORT LAUDERDALE

PROJECT #12455
TAXIWAY
INTERSECTION IMPROVEMENTS

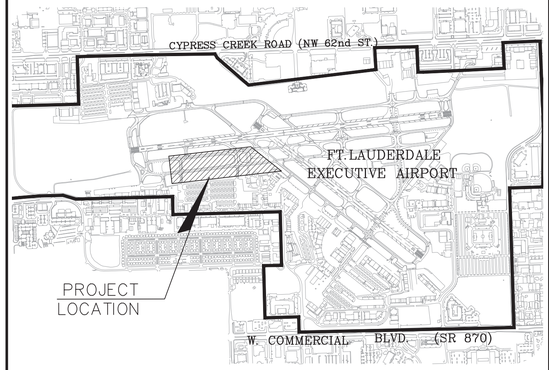
6000 NW 21st Avenue

FORT LAUDERDALE, FLORIDA

FDOT Fin Proj No. 433478-1-94-1 (CONSTRUCTION)

FORT LAUDERDALE
EXECUTIVE AIRPORT

ATTENTION IS DIRECTED TO THE FACT THAT THESE PLANS MAY HAVE REDUCED IN SIZE BY REPRODUCTION. THIS MUST BE TAKEN INTO ACCOUNT WHEN OBTAINING SCALED DATA.



NORTH

LOCATION SKETCH

PROJECT #12455
FXE TAXIWAY
INTERSECTION IMPROVEMENTS
6000 NW 21st Avenue, Fort lauderdale, Florida

CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

FORT LAUDERDALE CITY COMMISSION

DEAN J. TRANTALIS	MAYOR
BEN SORENSEN	VICE MAYOR/ COMMISSIONER - DISTRICT III
HEATHER MORAITIS	COMMISSIONER - DISTRICT I
STEVEN GLASSMAN	COMMISSIONER - DISTRICT II
ROBERT L. McKINZIE	COMMISSIONER - DISTRICT IV

PROJECT MANAGER	JOB TITLE	PHONE NO.
KHANT MYAT P.E	AIRPORT ENGINEER	(954) 828-5061
THOMAS F. O'DONNELL P.E	CIVIL ENGINEER	(561) 840-0825
AMY CHAMPAGNE-BAKER P.E	ELECTRICAL ENGINEER	(561) 210-9224
WALTER DE LA ROSA, P.S.M.	SURVEYOR	(954) 585-3927

DATE: 01/22/2021

CAD FILE: 12444-000-COVR

DRAWING FILE No.: 4-141-47

BID SET

GENERAL NOTES

1. THE CONTRACTOR SHALL COMPLY WITH ALL FEDERAL, STATE AND LOCAL SAFETY REGULATIONS.
2. THE CONTRACTOR SHALL COMPLY WITH ALL CITY, COUNTY AND STATE TRAFFIC REGULATIONS CONCERNING THE USE OF STREETS AND ROADWAYS FOR DELIVERIES AND HAULING. ANY DAMAGE DONE TO THE ROADWAYS DUE TO THE CONTRACTOR'S EQUIPMENT OR HAULING OPERATIONS SHALL BE REPAIRED TO THE OWNER'S SATISFACTION, AT NO COST TO THE OWNER. ALL HAULING UNITS TRANSPORTING LOOSE MATERIALS (SOIL, LIMEROCK, ETC.) SHALL BE FULLY COVERED.
3. THE CONTRACTOR SHALL COOPERATE WITH AIRPORT AUTHORITIES, USERS, TENANTS AND FIRE DEPARTMENT WHILE WORKING ON THIS PROJECT.
4. THE CONTRACTOR'S SUPERINTENDENT SHALL BE ON THE CONSTRUCTION SITE AT ALL TIMES DURING WORKING HOURS WHILE THIS PROJECT IS IN PROGRESS. THE CONTRACTOR'S SUPERINTENDENT SHALL BE THE DESIGNATED RESPONSIBLE CONTRACTOR REPRESENTATIVE, AND SHALL BE AVAILABLE IN CASE OF EMERGENCIES ON A 24-HOUR BASIS AND SHALL BE FLUENT IN SPOKEN ENGLISH.
5. NO FIELD CHANGES OR DEVIATIONS FROM DESIGN TO BE MADE WITHOUT PRIOR APPROVAL OF THE ENGINEER.
6. CONTRACTOR SHALL PROVIDE MAINTENANCE OF TRAFFIC DURING CONSTRUCTION IN ACCORDANCE WITH THESE PLANS AND ALL STATE, COUNTY AND LOCAL REQUIREMENTS.
7. BARRICADES ARE TO REMAIN UNTIL ALL PROJECT CONSTRUCTION IS COMPLETED UNLESS NOTED OTHERWISE BY THE ENGINEER.
8. THE CONTRACTOR SHALL CONDUCT THE FINAL CLEANING OF AFFECTED AIRPORT PAVEMENTS PRIOR TO REOPENING THE PAVEMENTS TO AIRPORT TRAFFIC. THE CONTRACTOR IS RESPONSIBLE FOR CONTINUOUS DAILY CLEAN UP OF THE WORK AREA. THE CONTRACTOR SHALL CONDUCT VACUUM CLEANING OF AFFECTED AIRPORT PAVEMENTS PRIOR TO REOPENING EACH PHASE OF THE PAVEMENTS TO AIR TRAFFIC. CONTRACTOR SHALL CONDUCT VACUUM CLEANING OF ACTIVE AIRPORT PAVEMENTS IMMEDIATELY FOLLOWING ANY ACCESS ONTO OR CROSSING THE PAVEMENT BY CONSTRUCTION TRAFFIC.
9. ALL LOCATIONS, DIMENSIONS AND ELEVATIONS MUST BE VERIFIED BY THE CONTRACTOR IN THE FIELD BEFORE COMMENCING WORK. ANY DISCREPANCY MUST BE BROUGHT TO THE ATTENTION OF THE ENGINEER IMMEDIATELY.
10. CONTRACTOR SHALL NOTE IN THE RECORD DRAWINGS ANY AND ALL PIPES, DUCTS AND CABLES FOUND DURING EXCAVATION, INDICATE EXACT POSITION, ELEVATION, DIRECTION, SIZE, MATERIAL, PURPOSE AND ACTIVE STATUS IF KNOWN.
11. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONARY MEASURES TO PROTECT EXISTING ABOVE GROUND IMPROVEMENTS THAT ARE TO REMAIN IN PLACE. ALL SUCH IMPROVEMENTS OR STRUCTURES DAMAGED BY THE CONTRACTOR'S OPERATIONS SHALL BE REPAIRED OR RECONSTRUCTED SATISFACTORY TO THE OWNER, AT THE EXPENSE OF THE CONTRACTOR.
12. IT IS THE CONTRACTORS' RESPONSIBILITY TO VERIFY AND CONFIRM THE LOCATION OF ALL UNDERGROUND FACILITIES WITHIN LIMITS OF CONSTRUCTION. ALL EXISTING UTILITIES, CABLES, EQUIPMENT, DEVICES, ETC., DESIGNATED TO REMAIN IN SERVICE WHICH ARE DAMAGED IN THE COURSE OF THE CONTRACT SHALL BE IMMEDIATELY REPAIRED AT THE EXPENSE OF THE CONTRACTOR. AT LEAST FORTY-EIGHT (48) HOURS PRIOR TO BEGINNING CONSTRUCTION THE CONTRACTOR SHALL CONTACT:

CITY OF FT. LAUDERDALE	
OPERATIONS	PHONE: (954) 828-4955
FPL	PHONE: (954) 956-2023
FAA REPRESENTATIVE	PHONE: (954) 359-5687

THE CONTRACTOR SHALL CONTACT SUNSHINE STATE ONE CALL AT 811 AT LEAST TWO (2) WORKING DAYS PRIOR TO EXCAVATION.

EXCAVATION IN AREAS OF EXISTING UTILITIES SHALL BE DONE BY HAND.

13. WHILE PERFORMING THE WORK, THE CONTRACTOR SHALL MAINTAIN ACCESS TO ANY AND ALL EXISTING AIRPORT OPERATIONS AND AIRCRAFT, VEHICULAR TRAFFIC AND PEDESTRIAN TRAFFIC NOT WITHIN THE CONSTRUCTION LIMITS FOR THE CURRENT PHASE OF CONSTRUCTION.
14. CONTRACTOR'S EMPLOYEES VEHICLES SHALL BE PARKED WITHIN THE CONTRACTOR'S STAGING AND STORAGE AREA. PARKING WILL NOT BE ALLOWED ALONG THE RIGHT-OF-WAY OF ANY PUBLIC ROADWAY. EMPLOYEE VEHICLES WILL NOT BE ALLOWED IN THE AIR OPERATION AREA (AOA).
15. CONSTRUCTION EQUIPMENT SHALL BE PARKED ONLY WITHIN THE CONTRACTOR'S STAGING AND STORAGE AREA OUTSIDE ESTABLISHED HOURS OF CONSTRUCTION.
16. RUBBER TIRED VEHICLES ONLY SHALL BE ALLOWED ON EXISTING AIRPORT PAVEMENT WHICH IS TO REMAIN.
17. THE CONTRACTOR SHALL CONTINUOUSLY MAINTAIN THE SITE FREE OF TRASH. ALL TRASH SHALL BE TOTALLY REMOVED FROM THE WORK AREA BEFORE THE END OF EACH WORK PERIOD.
18. UPON COMPLETION OF CONSTRUCTION, THE CONTRACTOR SHALL CLEAN AND RESTORE THE SITE. ALL RUBBISH AND OTHER MATERIAL SHALL BE DISPOSED OF OFF AIRPORT PROPERTY AT CONTRACTOR'S DISCRETION AND EXPENSE. THE CONTRACTOR SHALL RESTORE ALL GRASSED AND PAVED AREAS WHICH ARE DISTURBED BY CONSTRUCTION ACTIVITY TO THEIR PRE CONSTRUCTION CONDITION.
19. COMPENSATION FOR OPERATIONS THAT ARE NECESSARY TO CONTROL EROSION AS DIRECTED BY THE ENGINEER DURING CONSTRUCTION SHALL BE ACCORDING TO SPECIFICATION P-156 UNLESS SPECIFIC PAY ITEMS ARE SPECIFIED HEREIN.
20. ALL CONSTRUCTION STAKEOUT SHALL BE BY A QUALIFIED FLORIDA REGISTERED LAND SURVEYOR, AND IS THE RESPONSIBILITY OF THE CONTRACTOR. ANY DEVIATIONS FROM EXISTING GRADES AS SHOWN ON THE PLANS SHALL IMMEDIATELY BE REPORTED TO THE ENGINEER. EXISTING AIRPORT SURVEY MONUMENTS ARE LOCATED NEAR THE CONSTRUCTION AREA. THE CONTRACTOR SHALL AT THEIR EXPENSE, HAVE A QUALIFIED FLORIDA REGISTERED LAND SURVEYOR REPLACE ANY DISTURBED MONUMENT.
21. ALL EXISTING UTILITIES ARE TO REMAIN UNLESS OTHERWISE NOTED.
22. REFER TO THE CONTRACTOR ACCESS AND STAGING AREA PLAN FOR ACCESS POINTS TO BE USED BY THE CONTRACTOR FOR THIS PROJECT.
23. SPECIFICATIONS ARE PROVIDED WHICH REQUIRE THE CONTRACTOR TO APPLY EITHER WATER, CHEMICALS, VEGETATION OR OTHER MATERIALS TO PREVENT THE OCCURRENCE OF DUST WHICH WILL BE OBJECTIONABLE TO THE OPERATIONS OR USERS OF THE AREA. ALL COST FOR CONTROLLING DUST OR POLLUTANTS OF ANY KIND SHALL BE INCIDENTAL TO THE CONTRACT.
24. THE EXACT LIMITS, LIGHTING AND SECURITY REQUIREMENTS OF THE CONTRACTOR'S STAGING AND STORAGE AREA SHALL BE ESTABLISHED BY THE CONTRACTOR WITH APPROVAL OF THE OWNER IN AREAS GENERALLY AS SHOWN ON THE PLANS. ANY AND ALL REQUIRED UTILITIES FOR THE CONTRACTOR'S OPERATIONS SHALL BE ARRANGED FOR AND PAID FOR BY THE CONTRACTOR DIRECTLY WITH THE APPROPRIATE UTILITY AGENCIES. UTILITY ARRANGEMENTS SHALL BE SUBJECT TO APPROVAL BY THE OWNER. THE CONTRACTOR SHALL USE THE STORAGE AND STAGING AREA SHOWN ON THE PLANS FOR ITS SHOP, MATERIAL AND EQUIPMENT STORAGE AND OTHER PROJECT RELATED ACTIVITIES, INCLUDING EMPLOYEE PARKING. ALL COSTS ASSOCIATED WITH PREPARING THE STORAGE AND STAGING AREA SITE SHALL BE BORNE BY THE CONTRACTOR. THIS INCLUDES, BUT IS NOT LIMITED TO, CLEARING AND GRADING OF THE SITE, CONSTRUCTION OF ALL TEMPORARY UTILITIES, ACCESS ROADS, ALL SECURITY FENCING, CLEANUP AND RESTORATION OF SITE TO ORIGINAL CONDITION.
25. DO NOT SCALE DRAWINGS. USE GIVEN DIMENSIONS ONLY. LARGE SCALE PLANS GOVERN OVER SMALL SCALE PLANS.
26. THE CONTRACTOR SHALL ENDEAVOR TO PROTECT PRIVATE PROPERTY. ANY DAMAGE CAUSED BY THE CONTRACTOR IN THE PERFORMANCE OF THEIR WORK SHALL BE CORRECTED TO THE SATISFACTION OF THE ENGINEER AT THE CONTRACTORS EXPENSE.
27. ANY UNITED STATES COAST AND GEODETIC SURVEY (U.S.C.&G.S.) MONUMENTATION WITHIN THE CONSTRUCTION LIMITS SHALL BE PROTECTED. IF A MONUMENT IS IN DANGER OF DAMAGE, THE CONTRACTOR SHALL NOTIFY:

    THE NATIONAL GEODETIC SURVEY, INFORMATION SERVICE BRANCH,
    NOAA, N/NGS12
    1315 EAST-WEST HIGHWAY, ATTENTION SSMC-3 #9202
    SILVER SPRING, MARYLAND 20910-3282
    TELEPHONE: (301) 713-3242

28. NO ADJUSTMENT FOR ADDITIONAL COMPENSATION AND TIME WILL BE MADE FOR TIME LOST IN WORK AREAS CONTIGUOUS TO TAXIWAYS AND RUNWAYS DUE TO AIRCRAFT TRAFFIC.
29. ALL DEMOLITION WORK AND REMOVAL OF CONSTRUCTION DEBRIS SHALL BE CONDUCTED DURING HOURS APPROVED BY THE OWNER WITHOUT THE INTERRUPTION OF NORMAL AIRPORT DAILY ACTIVITIES.
30. CONTRACTOR SHALL PROVIDE CONSTRUCTION SITE ACCESS TO THE OWNER AND ITS REPRESENTATIVES FOR INSPECTION PURPOSES.
31. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SECURING THE WORK AREA AND COORDINATING THE OVERALL SECURITY OF THE WORK AREA AND MATERIAL STORAGE AND STAGING AREAS WITH THE OWNER.
32. THE CONTRACTOR IS REQUIRED TO PROVIDE LIGHTING FOR CONSTRUCTION DURING THE HOURS OF DARKNESS AS REQUIRED BY THE SPECIFICATIONS.

GENERAL EROSION CONTROL NOTES

1. THE PURPOSE OF EROSION CONTROL IS TO PREVENT POLLUTION OF BODIES OF WATER ON OR ADJACENT TO THE PROJECT SITE. IN ADDITION, EROSION CONTROL SHALL PREVENT DAMAGE TO ADJACENT PROPERTY, AIRPORT AND WORK IN PROGRESS.
2. ALL EROSION AND SILTATION MEASURES ARE TO BE PLACED PRIOR TO OR AS THE FIRST STEP IN GRADING. CARE AND MAINTENANCE OF EROSION CONTROL MEASURES SHALL BE IN ACCORDANCE WITH DRAWINGS, TECHNICAL SPECIFICATIONS, APPROVED STORMWATER POLLUTION PREVENTION PLAN (SWPPP) OR AS DIRECTED BY THE ENGINEER.
3. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO INSPECT ALL EROSION CONTROL DEVICES PERIODICALLY AND AFTER EVERY RAINFALL ANY NECESSARY REPAIRS OR CLEANUP TO MAINTAIN THE EFFECTIVENESS OF THE EROSION CONTROL DEVICES SHALL BE MADE IMMEDIATELY.
4. CONTRACTOR IS RESPONSIBLE FOR STORM WATER POLLUTION PREVENTION PLAN (SWPPP) AND RELATED ENVIRONMENTAL PERMITS.
5. CONTRACTOR WILL SUBMIT A PLAN FOR DUST CONTROL PRIOR TO ANY LAND DISTURBING ACTIVITIES PER ITEM C-102. THE PLAN MUST INCLUDE, BUT NOT BE LIMITED TO, PROVIDING A WATERING TRUCK ON A 24 BASIS CAPABLE OF BEING ON SITE WITHIN 30 MINUTES TO WATER DISTURBED AND UNPROTECTED SURFACES.

SYMBOLS

219	EXISTING GUIDANCE SIGNS AND SIGN NUMBER
	EXISTING RUNWAY / TAXIWAY LIGHT
J10	EXISTING JUNCTION CAN
P	EXISTING PAPI UNIT
BVC	BEGIN VERTICAL CURVE
EVC	END VERTICAL CURVE
RP	RADIUS POINT
PVI	POINT OF VERTICAL INTERSECTION
1	HORIZONTAL AND VERTICAL CONTROL POINT
	SURVEY IRON ROD & CAP
TB-3	BORING LOCATION
C-3	BORING CORE LOCATION
11.00	EXISTING CONTOUR
11.00	PROPOSED CONTOUR
+12.33	PROPOSED ELEVATION

ABBREVIATIONS

AB	AGGREGATE BASE COURSE
AC	ADVISORY CIRCULAR OR ASPHALTIC CONCRETE
AOA	AIR OPERATION AREA
APPROX	APPROXIMATE
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS
ATCT	AIR TRAFFIC CONTROL TOWER
BC	BEGIN CURVE
BVC	BEGIN VERTICAL CURVE
℄	CENTER LINE
CTB	CEMENT TREATED BASE
CY	CUBIC YARDS
DIA	DIAMETER
E	EASTING - ELECTRICAL - EAST
EA	EACH
EC	END CURVE
EL	ELEVATION
ELEV	ELEVATION
EVC	END VERTICAL CURVE
EXIST	EXISTING
FAA	FEDERAL AVIATION ADMINISTRATION
FL	FLOWLINE
FPL	FLORIDA POWER AND LIGHT
FT	FEET
FXE	FT. LAUDERDALE EXECUTIVE AIRPORT
G	GAS
GA	GAUGE
GAL	GALLON
GALV	GALVANIZED
HP	HIGH POINT
ILS	INSTRUMENT LANDING SYSTEM
INV	INVERT
KV	KILOVOLT
K	LENGTH OF CURVE/GRADE IN - GRADE OUT
LF	LINEAR FOOT
LP	LOW POINT
LS	LUMP SUM
LT	LEFT
MALS	MEDIUM INTENSITY AIRPORT LIGHTING SYSTEM
MALSR	MEDIUM INTENSITY AIRPORT LIGHTING SYSTEM RAIL
MAX	MAXIMUM
MH	MANHOLE
MIN	MINIMUM
MOT	MAINTENANCE OF TRAFFIC
N	NORTHING - NORTH
NAVD	NORTH AMERICAN VERTICAL DATUM
NEMA	NATIONAL ELECTRICAL MANUFACTURES ASSOCIATION
NO	NUMBER
NOTAM	NOTICE TO AIRMEN
NTS	NOT TO SCALE
OC	ON CENTER
OD	OUTSIDE DIAMETER
PAPI	PRECISION APPROACH PATH INDICATOR
PC	POINT OF CURVATURE
PI	POINT OF INTERSECTION
PROP	PROPOSED
PSI	POUNDS PER SQUARE INCH
PT	POINT OF TANGENCY
PVC	POLYVINYL CHLORIDE
PVI	POINT OF VERTICAL INTERSECTION
R	RADIUS
RP	RADIUS POINT
RPZ	RUNWAY PROTECTION ZONE
RSA	RUNWAY SAFETY AREA
RT	RIGHT
R/W	RUNWAY
RW	RIGHT-OF-WAY
S	SLOPE OR SOUTH
SF	SEMI-FLUSH - SQUARE FEET
STA	STATION
STD	STANDARD
SY	SQUARE YARDS
TOFA	TAXIWAY OBJECT FREE AREA
TWY	TAXIWAY
TSA	TAXIWAY SAFETY AREA OR TRANSPORTATION SECURITY ADMINISTRATION
T/W	TAXIWAY
TYP	TYPICAL
VERT	VERTICAL
VC	VERTICAL CURVE
W	WEST - WATER

CALL 48 HOURS BEFORE YOU DIG

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811 Know what's **below.** **Call** before you dig.

SUNSHINE STATE ONE CALL OF FLORIDA, INC.

CALL 48 HOURS BEFORE DIGGING FAA FACILITIES 954-356-7212

Kimley»Horn
Kimley-Horn and Associates, Inc.
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600 N. PINE ISLAND RD, SUITE 450, PLANTATION, FL 33324
FBPE No. CA 00000696
JOB NO. 044693067

HILLERS ELECTRICAL ENGINEERING, INC.
23257 STATE ROAD 7, SUITE 100
BOCA RATON, FLORIDA 33428
(561) 451-9185 PHONE
(561) 451-4886 FAX

BID SET

State of Florida
Professional Engineer
License No. 62478
THOMAS F. O'DONNELL

DRAWN BY:	DATE:
MEM	01/22/2021
DESIGNED BY:	SCALE:
MEM	AS NOTED
CHECKED BY:	
TFO	
FIELD BOOK:	

CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

REVISIONS

NO.	DATE	BY	CHK'D	DESCRIPTION

PROJECT # 12455
TAXIWAY INTERSECTION IMPROVEMENTS
GENERAL NOTES

SHEET NO.	OF
C01	41
TOTAL:	65
CAD FILE: 12444-C01-NOTE	
DRAWING FILE NO. 4-141-47	

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6/16/2021 10:35 AM

SUMMARY OF QUANTITIES

BASE BID				
ITEM NO.	ITEM DESCRIPTION	QUANTITY		UNIT
		CONTRACT	AS-BUILT	
C-100-14.1	CONTRACTOR QUALITY CONTROL PROGRAM (CQCP)	1		LS
C-102-5.1	TEMPORARY AIR AND WATER POLLUTION, SOIL EROSION, AND SILTATION CONTROL	1		LS
C-105-6.1	MOBILIZATION	1		LS
S-102-5.1	AIRPORT SAFETY AND MAINTENANCE OF TRAFFIC	1		LS
S-102-5.2	TEMPORARY FENCE FOR OWL/TORTOISE NESTS	10		EA
S-103-5.1	PROJECT SURVEY AND STAKEOUT	1		LS
S-906-5.1	HYDROSEEDING	11,650		SY
P-101-5.1	FULL DEPTH ASPHALT PAVEMENT REMOVAL	5,120		SY
P-101-5.2	BITUMINOUS PAVEMENT MILLING (VARIABLE DEPTH, MAX 2")	17,030		SY
P-152-4.1	UNCLASSIFIED EXCAVATION	4,900		CY
P-152-4.2	EMBANKMENT	760		CY
P-152-4.3	UTILITY SOFT DIG	1		LS
S-154-5.1	SUBBASE COURSE (12" THICKNESS)	3,260		SY
S-154-5.2	SUBBASE COURSE, SHOULDER (6" THICKNESS)	10,440		SY
P-211-5.1	LIME ROCK BASE COURSE (6" THICKNESS)	1,400		SY
P-211-5.2	LIME ROCK BASE COURSE (9" THICKNESS)	2,980		SY
P-211-5.2	LIME ROCK TRANSITIONAL WEDGES	2,765		LF
P-401-8.1	HOT MIXED ASPHALT PAVEMENT	5,110		TON
P-602-5.1	EMULSIFIED ASPHALT PRIME COAT	5,890		GAL
P-603-5.1	EMULSIFIED ASPHALT TACK COAT	2,360		GAL
P-620-5.1	PERMANENT AIRFIELD PAINTING WITH TYPE III GLASS BEADS (YELLOW AND WHITE)	10,370		SF
P-620-5.2	PERMANENT AIRFIELD PAINTING WITH TYPE I GLASS BEADS (RED SURFACE PAINTED SIGNS)	230		SF
P-620-5.3	PERMANENT AIRFIELD PAINTING WITH NO GLASS BEADS (BLACK)	12,740		SF
P-620-5.4	TEMPORARY AIRFIELD PAINTING WITH TYPE I GLASS BEADS (YELLOW AND WHITE)	10,370		SF
P-620-5.5	TEMPORARY AIRFIELD PAINTING WITH NO GLASS BEADS (RED SURFACE PAINTED SIGN)	230		SF
P-620-5.6	AIRFIELD PAINT REMOVAL	750		SF
T-904-5.1	SODDING	15,025		SY
L-108-5.1	HAND EXCAVATE MINIMUM 8" WIDE X 28" DEEP IN EARTH.	50		LF
L-108-5.2	SAW CUT AND HAND EXCAVATE MINIMUM 8" WIDE X 28" DEEP IN EXISTING FULL STRENGTH PAVEMENT.	25		LF
L-108-5.3	3/4" X 20' GROUND RODS CONNECTED TO COUNTERPOISE.	20		EA
L-108-5.4	ADDITIONAL 10' GROUND ROD SECTIONS.	16		EA
L-108-5.5	#6 BARE SOLID AWG COUNTERPOISE CONDUCTOR INSTALLED OVER CONDUIT SYSTEM.	8,000		LF
L-108-5.6	#8, 5KV, L-824 CONDUCTOR INSTALLED IN NEW AND EXISTING CONDUIT/ DUCTBANK SYSTEM.	10,250		LF
L-110-5.1	ONE 2" SCHEDULE 40 PVC CONDUIT NON-ENCASED DIRECT BURIED IN EARTH, 24-INCH MINIMUM COVER, COMPLETE IN PLACE.	7,500		LF
L-110-5.2	ONE 2" SCHEDULE 40 PVC CONDUIT CONCRETE ENCASED INSTALLED IN NEW FULL STRENGTH PAVEMENT, 24-INCH MINIMUM COVER, COMPLETE IN PLACE.	1,050		LF
L-110-5.3	ONE 2" SCHEDULE 40 PVC CONDUIT CONCRETE ENCASED INSTALLED IN EXISTING FULL STRENGTH PAVEMENT, 24-INCH MINIMUM COVER, COMPLETE IN PLACE.	325		LF
L-110-5.4	INTERCEPT EXISTING CONDUIT SYSTEM AND CONNECT TO NEW CONDUIT SYSTEM.	18		EA
L-110-5.5	HAND EXCAVATE AND CONCRETE ENCASE EXISTING 1W2" CONDUIT, COMPLETE.	250		LF
L-115-5.1	L-867 16" DIAMETER JUNCTION CAN WITH COVER INSTALLED IN EARTH.	1		EA
L-115-5.2	L-867 16" DIAMETER BOTTOMLESS 2 CAN JUNCTION CAN PLAZA INSTALLED IN EARTH.	4		EA
L-115-5.3	L-867 16" DIAMETER BOTTOMLESS 4 CAN JUNCTION CAN PLAZA INSTALLED IN EARTH.	2		EA
L-115-5.4	INTERCEPT EXISTING LIGHT BASE CAN IN EARTH AND CONNECT TO CONDUIT SYSTEM.	2		EA
L-115-5.5	REMOVAL OF EXISTING JUNCTION CAN/LIGHT BASE CAN IN EARTH/EXISTING PAVEMENT, COMPLETE.	95		EA
L-115-5.6	REMOVAL OF EXISTING 2 CAN JUNCTION CAN PLAZA, COMPLETE.	6		EA
L-125-5.1	NEW L-861T(L), LED TAXIWAY ELEVATED EDGE LIGHT AND NEW BASE CAN INSTALLED IN EARTH.	90		EA
L-125-5.2	NEW L-861T(L), LED TAXIWAY ELEVATED EDGE LIGHT INSTALLED ON EXISTING BASE CAN.	-		EA
L-125-5.3	REMOVAL OF EXISTING GUIDANCE SIGN AND CONCRETE BASE IN EARTH/EXISTING PAVEMENT, COMPLETE.	12		EA
L-125-5.4	NEW L-858(L), SIZE 1, 3-4 CHARACTERS LED GUIDANCE SIGN AND CONCRETE BASE INSTALLED IN EARTH.	8		EA
L-125-5.5	NEW L-858(L), SIZE 1, 5-6 CHARACTERS LED GUIDANCE SIGN AND CONCRETE BASE INSTALLED IN EARTH.	5		EA
L-125-5.6	INTERCEPT EXISTING CIRCUIT CONDUCTORS IN EXISTING BASE CAN/MANHOLE/JUNCTION CAN AND EXTEND CIRCUITS ACCORDINGLY.	20		EA
L-125-5.7	IDENTIFICATION OF CABLES, DUCTBANKS AND LIGHTING FIXTURES PER FAA SPECIFICATIONS.	1		LS
L-125-5.8	CONTRACTOR COORDINATION OF ALLOWANCE ACCOUNT LINE ITEM	1		LS
L-125-5.9	ALLOWANCE ACCOUNT: MODIFY EXISTING AIRFIELD LIGHTING CONTROL SYSTEM, COMPLETE.	1		EA

ADD ALTERNATE 1				
ITEM NO.	ITEM DESCRIPTION	QUANTITY		UNIT
		CONTRACT	AS-BUILT	
L-108-5.3	3/4" X 20' GROUND RODS CONNECTED TO COUNTERPOISE.	1		EA
L-108-5.4	ADDITIONAL 10' GROUND ROD SECTIONS.	1		EA
L-108-5.5	#6 BARE SOLID AWG COUNTERPOISE CONDUCTOR INSTALLED OVER CONDUIT SYSTEM.	600		LF
L-108-5.6	#8, 5KV, L-824 CONDUCTOR INSTALLED IN NEW AND EXISTING CONDUIT/DUCTBANK SYSTEM.	850		LF
L-110-5.1	ONE 2" SCHEDULE 40 PVC CONDUIT NON-ENCASED DIRECT BURIED IN EARTH 24-INCH MINIMUM COVER, COMPLETE IN PLACE.	600		LF
L-110-5.4	INTERCEPT EXISTING CONDUIT SYSTEM AND CONNECT TO NEW CONDUIT SYSTEM.	8		EA
L-115-5.5	REMOVAL OF EXISTING JUNCTION CAN/LIGHT BASE CAN IN EARTH/EXISTING PAVEMENT, COMPLETE.	5		EA
L-125-5.1	NEW L-861T(L), LED TAXIWAY ELEVATED EDGE LIGHT AND BASE CAN INSTALLED IN EARTH.	5		EA
L-125-5.2	NEW L-861T(L), LED TAXIWAY ELEVATED EDGE LIGHT INSTALLED ON EXISTING BASE CAN.	26		EA
L-125-5.6	INTERCEPT EXISTING CIRCUIT CONDUCTORS IN EXISTING BASE CAN/MANHOLE/JUNCTION CAN AND EXTEND CIRCUITS ACCORDINGLY.	2		EA
L-125-5.7	IDENTIFICATION OF CABLES, DUCTBANKS AND LIGHTING FIXTURES PER FAA SPECIFICATIONS.	1		LS

State of Florida
Professional Engineer
License No. 62478
THOMAS F. O'DONNELL

DRAWN BY: MEM
DESIGNED BY: MEM
CHECKED BY: TFO
DATE: 01/22/2021
SCALE: AS NOTED
FIELD BOOK:

CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

REVISIONS

NO.	DATE	BY	CHK'D	DESCRIPTION

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600 N. PINE ISLAND RD, SUITE 450, PLANTATION, FL 33324
FIRE No. CA 00000696
JOB NO. 044693067

HILLERS ELECTRICAL ENGINEERING, INC.
23257 STATE ROAD 7, SUITE 100
BOCA RATON, FLORIDA 33428
(561) 451-9165 PHONE
(561) 451-4886 FAX

BID SET

PROJECT # 12455
TAXIWAY INTERSECTION IMPROVEMENTS
SUMMARY OF QUANTITIES

SHEET NO. C02 OF 41
TOTAL: 65
CAD FILE: 12444-C02-QUAN
DRAWING FILE NO. 4-141-47

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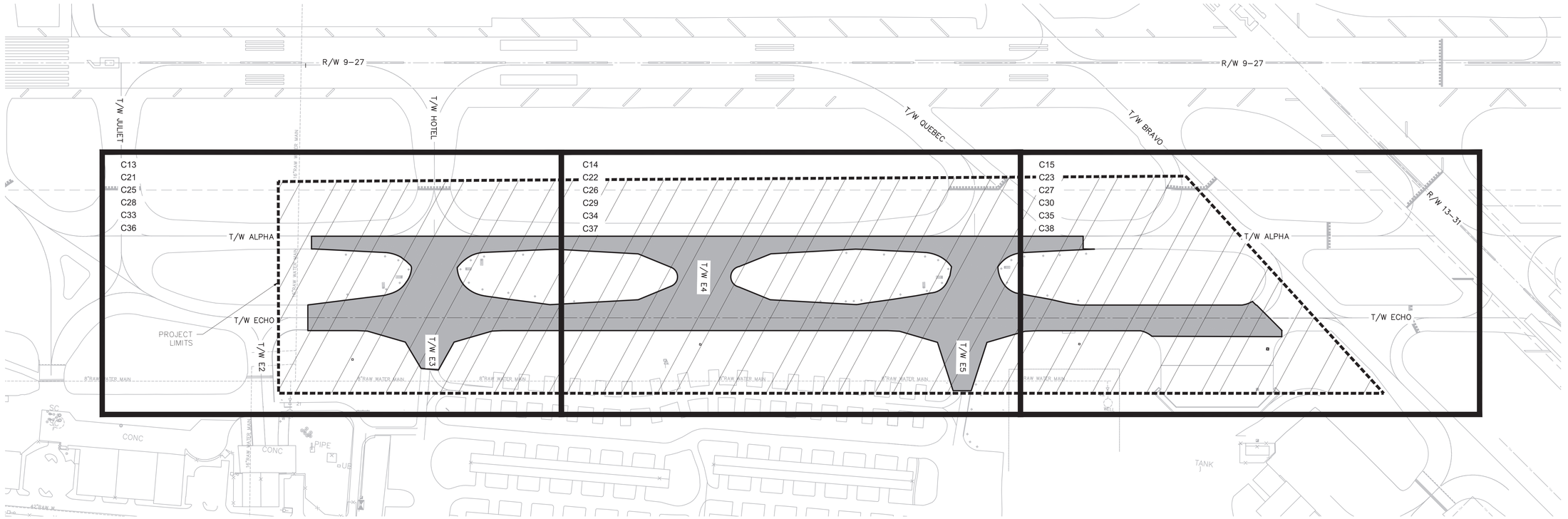
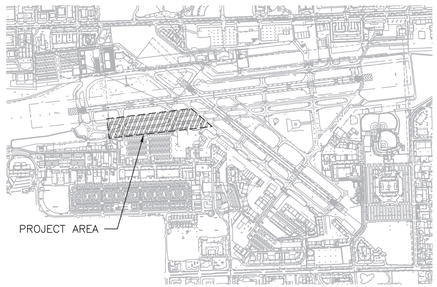
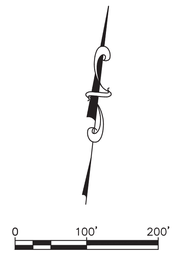


LEGEND

C13 – C15	EXISTING CONDITIONS
C21 – C23	DEMOLITION PLANS
C25 – C27	PAVEMENT GEOMETRY PLANS
C28 – C30	GRADING PLANS
C33 – C35	SPOT ELEVATION PLANS
C36 – C38	PAVEMENT MARKING PLANS
	PROJECT WORK AREA





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DRAWN BY: MEM	DATE: 01/22/2021		
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PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE
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REVISIONS

NO.	DATE	BY	CHK'D	DESCRIPTION

PROJECT # 12455
TAXIWAY INTERSECTION IMPROVEMENTS
KEY MAP

SHEET NO.	OF
C03	41
TOTAL:	65
CAD FILE: 12444-C03-KMAP	
DRAWING FILE NO. 4-141-47	

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6/16/2021 10:35 AM

LEGEND

ACCESS / HAUL ROUTE

CONTRACTOR'S STAGING AND STORAGE AREA. MAXIMUM EQUIPMENT HEIGHT = 20'

PROJECT BOUNDARY AREA

TEMPORARY SECURITY FENCE. SEE SHEET C05.

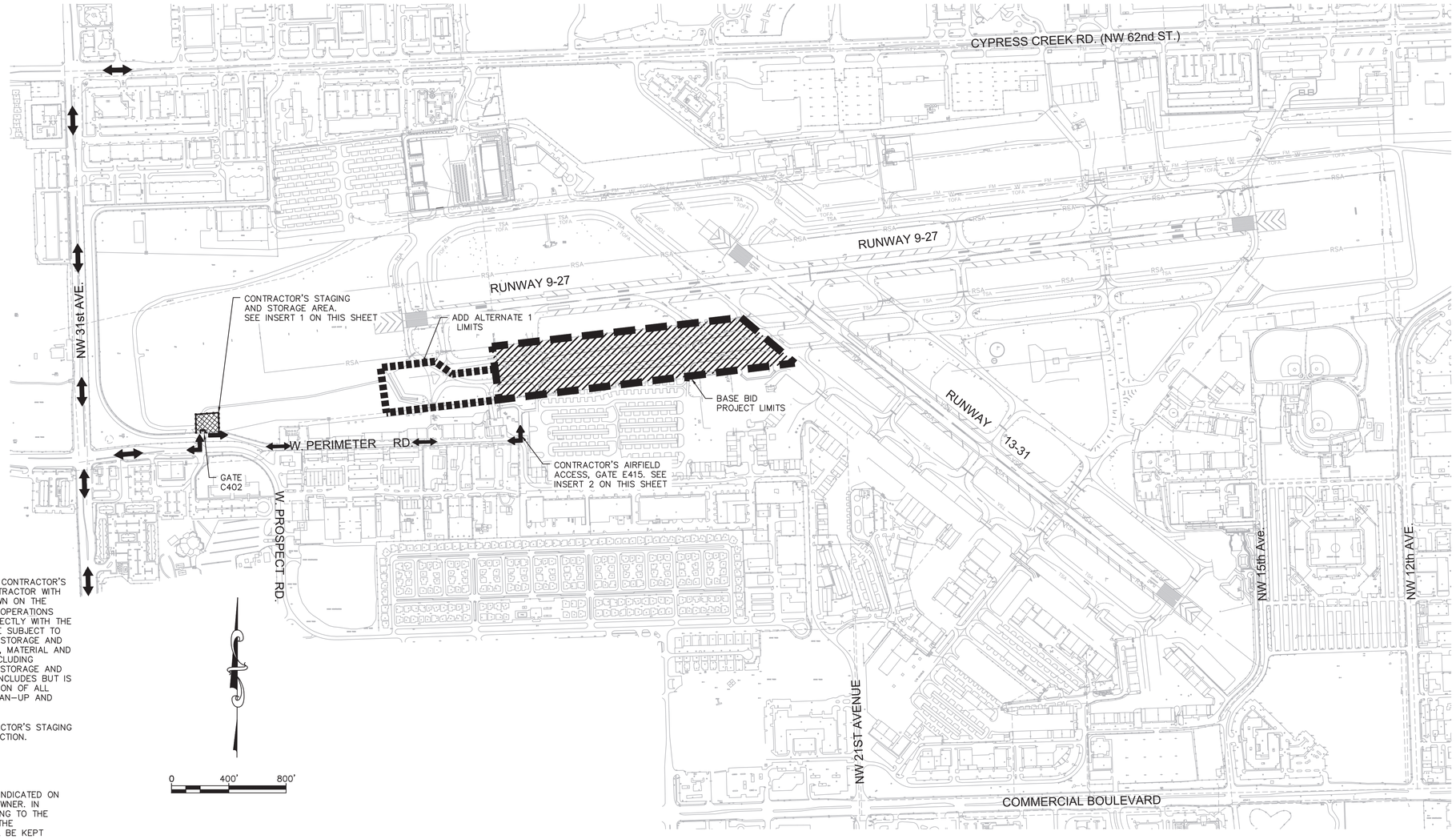
RSA — RUNWAY SAFETY AREA

(1) STAGING AREA: CONTRACTOR'S STAGING AND STORAGE AREA. STAGING AREAS SHALL BE CONSTRUCTED AS TO AVOID OWL/GOPHER TORTOISE BURROWS. EMPLOYEE VEHICLES SHALL NOT GO BEYOND CONTRACTORS FENCED STAGING AREA.

(2) CONTRACTOR'S ACCESS GATE. CONTRACTOR TO REMOVE EXISTING GATES PRIOR TO CONSTRUCTION. TEMPORARY GATES TO BE INSTALLED AT EACH LOCATION. TEMPORARY GATES TO BE REMOVED AND ORIGINAL GATES RESTORED AFTER CONSTUCTION IS COMPLETE. INSTALLATION AND REMOVAL OF TEMPORARY GATES ARE TO BE INCLUDED IN MOBILIZATION PAY ITEM.

(3) CONTRACTOR'S SECURITY GUARD SHACK LOCATION.

[S] CONSTRUCTION TRAFFIC SIGN

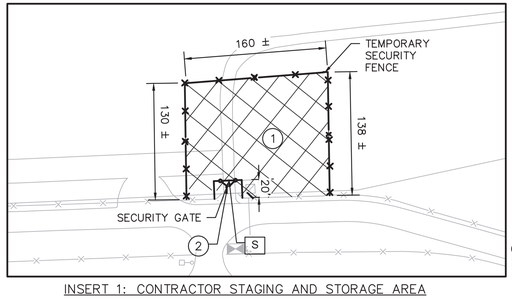


CONTRACTOR STAGING AREA NOTES:

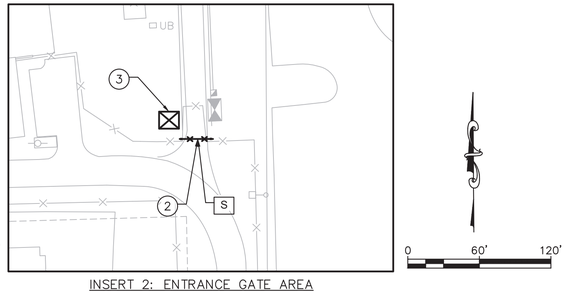
1. THE EXACT LIMITS, LIGHTING AND SECURITY REQUIREMENTS OF THE CONTRACTOR'S STAGING AND STORAGE AREA SHALL BE ESTABLISHED BY THE CONTRACTOR WITH THE APPROVAL OF THE OWNER IN THE AREAS GENERALLY AS SHOWN ON THE PLANS. ANY AND ALL REQUIRED UTILITIES FOR THE CONTRACTOR'S OPERATIONS SHALL BE ARRANGED FOR AND PAID FOR BY THE CONTRACTOR DIRECTLY WITH THE APPROPRIATE UTILITY AGENCIES. UTILITY ARRANGEMENTS SHALL BE SUBJECT TO THE APPROVAL OF THE OWNER. THE CONTRACTOR SHALL USE THE STORAGE AND STAGING AREA SHOWN ON THE PLANS FOR ITS FIELD OFFICE, SHOP, MATERIAL AND EQUIPMENT STORAGE, AND OTHER PROJECT RELATED ACTIVITIES, INCLUDING EMPLOYEE PARKING. ALL COSTS ASSOCIATED WITH PREPARING THE STORAGE AND STAGING AREA SITE SHALL BE BORNE BY THE CONTRACTOR. THIS INCLUDES BUT IS NOT LIMITED TO, CLEARING AND GRADING OF THE SITE, CONSTRUCTION OF ALL TEMPORARY UTILITIES, ACCESS ROADS, ALL SECURITY FENCING, CLEAN-UP AND RESTORATION OF SITE TO ORIGINAL CONDITION.
2. CONSTRUCTION EQUIPMENT SHALL BE PARKED ONLY WITHIN CONTRACTOR'S STAGING AND STORAGE AREA OUTSIDE OF ESTABLISHED HOURS OF CONSTRUCTION.

ACCESS AND HAUL ROAD NOTES:

1. HAUL ROADS TO BE USED UNDER THIS PROJECT SHALL BE THOSE INDICATED ON THE DRAWINGS OR OTHERWISE SPECIFICALLY AUTHORIZED BY THE OWNER. IN GENERAL, THE CONTRACTOR SHALL CONFINE EQUIPMENT AND HAULING TO THE AREAS UNDER CONSTRUCTION. NO DEBRIS SHALL BE ALLOWED ON THE ROADWAYS OR AIRPORT PAVED SURFACES. ACTIVE TAXIWAYS SHALL BE KEPT FREE OF DEBRIS AT ALL TIMES. CONTRACTOR SHALL MAINTAIN VACUUM SWEEPERS ON SITE FOR THAT USE. OTHER PAVEMENTS SHALL BE CLEANED BY THE CONTRACTOR DAILY, AND AS REQUIRED, USING VACUUM SWEEPERS TO KEEP ALL ACCESS AND CONSTRUCTION AREAS CLEAR OF SOILS, CLODS OR OTHER DEBRIS.
2. THE ACCESS POINTS TO THE PROJECT SITE ARE SHOWN ON THE PLANS.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR RESTORING ALL AIRPORT SERVICE ROADS TO THEIR PRECONSTRUCTION CONDITION WHERE SUCH ROADS ARE USED BY THE CONTRACTOR FOR HAULING OPERATIONS.
4. THE CONTRACTOR SHALL RESTORE ALL TURFED AND PAVED AREAS USED FOR HAUL ROADS TO THEIR ORIGINAL CONDITION, INCLUDING THE ESTABLISHMENT OF TURF. ALL COSTS FOR CONSTRUCTING, REMOVING AND RESTORING OF HAUL ROADS REQUIRED FOR THE COMPLETION OF THE WORK SHALL BE BORNE BY THE CONTRACTOR.
5. THE CONTRACTOR SHALL NOT PERMIT ANY UNAUTHORIZED CONSTRUCTION PERSONNEL OR TRAFFIC ON THE SITE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR TRAFFIC CONTROL TO AND FROM THE VARIOUS CONSTRUCTION AREAS ON THE SITE. THE CONTRACTOR IS RESPONSIBLE FOR THE IMMEDIATE CLEAN-UP OF ANY DEBRIS DEPOSITED AT THE PROJECT SITE AND ALONG ANY ROAD AS A RESULT OF HIS/HER CONSTRUCTION TRAFFIC. DIRECTIONAL SIGNAGE AT THE ACCESS GATE AND ALONG THE DELIVERY ROUTE TO THE STORAGE AREA OR WORK SITE SHALL BE APPROVED BY THE OWNER.
ALL CONTRACTOR'S MATERIAL ORDERS FOR DELIVERY TO THE SITE SHALL BE DIRECTED TO THE ACCESS POINTS IDENTIFIED.
6. RUBBER TIRED VEHICLES ONLY SHALL BE ALLOWED ON EXISTING AIRPORT PAVEMENT WHICH IS TO REMAIN.
7. THE CONTRACTOR, THROUGH THE CONTRACTOR SECURITY OFFICER, SHALL ESTABLISH AND MAINTAIN A LIST OF CONTRACTOR AND SUBCONTRACTOR VEHICLES AUTHORIZED TO OPERATE ON THE SITE. VEHICLE PERMITS SHALL BE ASSIGNED IN ACCORDANCE WITH AIRPORT SECURITY PROCEDURES.
8. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE OFF-SITE ROUTES (STATE HIGHWAYS, COUNTY ROADS OR CITY STREETS) WITH THE APPROPRIATE OWNER WHO HAS JURISDICTION OVER THE AFFECTED ROUTE.
9. ALL CONTRACTOR VEHICLES AND TRAFFIC SHALL REMAIN WITHIN THE DESIGNATED CONSTRUCTION AREAS, STAGING AREAS OR HAUL ROUTES.
10. ALL CONTRACTOR VEHICLES SHALL DISPLAY IN FULL VIEW LOGOS CONSPICUOUSLY PLACED ON EACH SIDE OF THE VEHICLE WITH 4" MINIMUM LETTER HEIGHT . ALL VEHICLES OPERATING IN THE ACTIVE AOA DURING HOURS OF LOW VISIBILITY OR DARKNESS SHALL BE EQUIPPED WITH A FLASHING AMBER (YELLOW) DOME-TYPE LIGHT MOUNTED ON TOP OF THE VEHICLE AND OF SUCH INTENSITY TO CONFORM TO AIRPORT CODES FOR MAINTENANCE AND EMERGENCY VEHICLES.
11. NO CONTRACTOR VEHICLES ARE TO CROSS ACTIVE RUNWAYS, NAVAID CRITICAL AREAS, TAXIWAYS AND APPROACH CLEAR ZONES UNLESS THE ESCORT IS UNDER THE DIRECT CONTROL OF THE AIRPORT GROUND CONTROLLER. CONTRACTOR VEHICLES TO HAVE A WORKING STROBE LIGHT ON AT ALL TIMES. IT SHALL BE UNDERSTOOD BY THE CONTRACTOR THAT AIRPORT TRAFFIC ON RUNWAYS, TAXIWAYS AND APRONS SHALL HAVE PRIORITY OVER CONTRACTOR'S TRAFFIC.
12. CONTRACTOR SHALL PROVIDE PROFESSIONALLY PAINTED SIGNS TO DIRECT MATERIAL SUPPLIERS AND EMPLOYEES TO THE CONSTRUCTION SITE. SIGN AT ENTRANCE GATE SHALL BE PROFESSIONALLY PAINTED 4' X 8' AND READ "CONSTRUCTION VEHICLES ONLY – NO VENDORS ALLOWED."
13. CONTRACTOR ACCESS GATES SHALL BE GUARDED OR LOCKED. CONTRACTOR SHALL PROVIDE GATE GUARDS.
14. CONTRACTOR SHALL OBTAIN AT HIS OWN EXPENSE ANY PERMITS, INCLUDING BUT NOT LIMITED TO DRIVEWAY PERMITS, FOR CONSTRUCTION AND USE OF ACCESS GATE.
15. ACCESS GATE LOCATION IS SUBJECT TO APPROVAL BY OWNER.
16. UPON COMPLETION OF CONSTRUCTION, CONTRACTOR SHALL REMOVE TEMPORARY ACCESS GATES AND RESTORE FENCE, SWALES, SOD ETC. TO ORIGINAL CONDITION.
17. COVER EXISTING UTILITIES IN AREAS OF TRUCK TRAFFIC WITH MINIMUM 12" OF LIMEROCK, INCLUDE IN PAY ITEM FOR MOBILIZATION.
18. DISPOSAL OF MILLING WILL BE ON SITE FOR USE TO CONSTRUCT SERVICE ROADS, FOR DISPOSAL IN AREAS SHOWN ON PLANS, AND IN OTHER ON AIRPORT SITES AS DIRECTED BY OWNER. ROUTING OF VEHICLES FOR DISPOSAL OF MILLING WILL BE AS APPROVED BY OWNER AND ATCT AND MAY REQUIRE RADIO CONTACT WITH ATCT DURING HAULING OPERATIONS.
THE CONTRACTOR SHALL BE RESPONSIBLE FOR HAULING THE MILLINGS NOT USED ON THE AIRPORT OFFSITE AT NO COST TO THE OWNER.



INSERT 1: CONTRACTOR STAGING AND STORAGE AREA



INSERT 2: ENTRANCE GATE AREA

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600 N. PINE ISLAND RD, SUITE 450, PLANTATION, FL 33324
FBPE No. CA 00000696
JOB NO. 044693067

HILLERS ELECTRICAL ENGINEERING, INC.
23257 STATE ROAD 7, SUITE 100
BOCA RATON, FLORIDA 33428
(561) 451-9185 PHONE
(561) 451-4886 FAX

State of Florida
Professional Engineer
License No. 62478
THOMAS F. O'DONNELL

DRAWN BY:	DATE:
MEM	01/22/2021
DESIGNED BY:	SCALE:
MEM	AS NOTED
CHECKED BY:	
TFO	
FIELD BOOK:	

CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

REVISIONS

NO.	DATE	BY	CHK'D	DESCRIPTION

PROJECT # 12455
TAXIWAY INTERSECTION IMPROVEMENTS
ACCESS AND STAGING PLAN

SHEET NO.	OF
C04	41
TOTAL:	65
CAD FILE: 12444-C04-STAG	
DRAWING FILE NO. 4-141-47	

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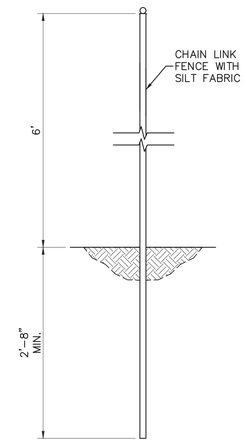
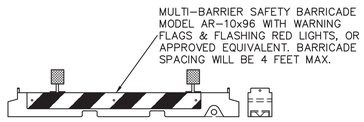
CONSTRUCTION SAFETY NOTES:

1. ALL CONSTRUCTION FOR THIS PROJECT SHALL CONFORM TO THE GUIDELINES SET FORTH IN FEDERAL AVIATION ADMINISTRATION (FAA) AC150/5370–2F "OPERATIONAL SAFETY AIRPORTS DURING CONSTRUCTION", AND THESE PLANS AND SPECIFICATIONS.
2. CONSTRUCTION ACTIVITIES ARE NOT PERMITTED WITHIN THE RUNWAY SAFETY AREA (RSA) OF ANY RUNWAY THAT IS OPEN FOR AIRCRAFT OPERATIONS. (SEE SECTION 221, AC 150/5370–2F, CHAPTER 2)
3. CONSTRUCTION ACTIVITIES ARE NOT PERMITTED WITHIN TAXIWAY SAFETY AREA (TSA) OF AN ACTIVE TAXIWAY PLUS AN ON– APRON TAXILANE WITHOUT THE PRIOR WRITTEN APPROVAL OF THE OWNER. (SEE SECTION 211, AC No. 150/5370–2F, CHAPTER 2)
4. NO CONSTRUCTION TRAFFIC SHALL ENTER OR CROSS ANY ACTIVE AIRPORT OPERATIONAL AREA EXCEPT UPON AUTHORIZATION BY THE OWNER. THIS SPECIFICALLY INCLUDES THE RUNWAY PROTECTION ZONES AND THE RUNWAY AND TAXIWAY CONSTRUCTION SAFETY LIMITS IDENTIFIED IN CONSTRUCTION NOTES 2 AND 3 ABOVE.
5. NO CONSTRUCTION TRAFFIC SHALL ENTER OR CROSS ANY LOCALIZER OR GLIDE SLOPE CRITICAL AREA EXCEPT UPON AUTHORIZATION BY THE OWNER.
6. IN ORDER FOR THE CONTRACTOR TO OPERATE WITHIN THE AIR OPERATIONS AREA, APPROPRIATE NOTICES TO AIRMEN (NOTAMS) MUST BE ISSUED BY THE OWNER THROUGH THE FAA FLIGHT SERVICE STATION. THESE NOTICES PROVIDE INFORMATION ON CLOSED, LIMITED, OR HAZARDOUS CONDITIONS TO AIRMEN AND USERS OF THE AIRPORT. A 72–HOUR NOTICE IS REQUIRED FOR ISSUANCE OF THE NOTAM. ALL CONSTRUCTION OPERATIONS MUST BE CLOSELY COORDINATED WITH THE OWNER FOR NOTAM ISSUANCE.
7. AIRCRAFT OPERATIONS SHALL AT ALL TIMES HAVE PRIORITY OVER ALL VEHICLES, EQUIPMENT AND PERSONNEL. THE CONTRACTOR SHALL EMPLOY STRICT MEASURES TO PREVENT ANY CONFLICT BETWEEN HIS PERSONNEL AND AIRCRAFT ON ANY ACTIVE AIRFIELD PAVEMENT. THE CONTRACTOR SHALL REMAIN CLEAR OF ACTIVE RUNWAYS AND TAXIWAYS.
8. ALL CONTRACTOR VEHICLES, INCLUDING HAULING VEHICLES, THAT ARE AUTHORIZED TO OPERATE WITHIN THE SECURITY FENCE ON THE AIRPORT WITHIN THE DESIGNATED LIMITS OF CONSTRUCTION OR HAUL ROUTES AS DEFINED HEREIN, SHALL DISPLAY IN FULL VIEW ABOVE THE VEHICLE A 3'x3' OR LARGER ORANGE AND WHITE CHECKERBOARD FLAG, EACH CHECKERBOARD COLOR BEING 1'SQUARE. WHEN OPERATING DURING PERIODS OF DARKNESS OR LIMITED VISIBILITY, CONTRACTOR'S VEHICLES SHALL BE EQUIPPED WITH ROTATING OR FLASHING AMBER LIGHTS. DURING SUCH PERIODS, HAULING VEHICLES NOT SO EQUIPPED SHALL BE ESCORTED BY A VEHICLE SO EQUIPPED.
9. CONTRACTOR SHALL CONTROL THE ON–AIRPORT MOVEMENT AND ACTIVITIES OF ITS EMPLOYEES AND SUBCONTRACTORS.
10. OPEN–FLAME WELDING OR TORCH–CUTTING OPERATIONS ARE PROHIBITED UNLESS ADEQUATE FIRE AND SAFETY PRECAUTIONS ARE PROVIDED AND HAVE BEEN APPROVED BY THE OWNER.
11. OPEN TRENCHES, EXCAVATIONS AND STOCKPILED MATERIALS AT THE CONSTRUCTION SITE SHALL BE PROMINENTLY MARKED WITH ORANGE FLAGS AND LIGHTED WITH FLASHING AMBER LIGHT UNITS (ACCEPTABLE TO THE OWNER) DURING HOURS OF RESTRICTED VISIBILITY OR DARKNESS.
12. STOCKPILED MATERIAL SHALL BE CONSTRAINED IN A MANNER TO PREVENT MOVEMENT AS A RESULT OF AIRCRAFT, WIND, AND/OR OTHER REASON.
13. ANY DAMAGE TO THE EXISTING AIRPORT LIGHTING SYSTEM CAUSED BY CONSTRUCTION OPERATIONS SHALL BE IMMEDIATELY NOTED TO THE OWNER AND REPAIRED BY THE CONTRACTOR AT ITS OWN EXPENSE.
14. CONTRACTOR GENERATED DEBRIS, WASTE AND LOOSE MATERIAL CAPABLE OF CAUSING DAMAGE TO AIRCRAFT LANDING GEAR, PROPELLERS AND ROTORS, OR OF BEING INGESTED BY JET ENGINES SHALL NOT BE LEFT ON ACTIVE AIRCRAFT MOVEMENT AREAS. MATERIAL DROPPING WITHIN THESE AREAS SHALL BE REMOVED IMMEDIATELY AND CONTINUOUSLY DURING WORKING HOURS.
15. CONTRACTOR SHALL BE RESPONSIBLE FOR INFORMING ALL PERSONS UNDER ITS CONTROL THAT UNAUTHORIZED CONSTRUCTION PERSONNEL FOUND IN RESTRICTED AREAS OF THE AIRPORT SHOWN ON THE SAFETY PLAN ARE SUBJECT TO ARREST FOR A PUNISHABLE FEDERAL OFFENSE AND WILL PROMPTLY AND PERMANENTLY BE REMOVED FROM THE JOB.
16. CONTRACTOR ACCESS GATES SHALL BE MANNED BY A CONTRACTOR SUPPLIED GATE GUARD OR REMAIN LOCKED AT ALL TIMES. APPROVED GATE GUARD SHALL CONTROL ACCESS TO ALLOW ONLY AUTHORIZED CONSTRUCTION TRAFFIC TO ENTER THE SITE.
17. AIRPORT STAFF SHALL CONTROL AND ESCORT ALL CONSTRUCTION TRAFFIC ENTERING THE SECURED AREA OF THE AIRPORT TO PREVENT CONFLICTS WITH AIRCRAFT OPERATIONS. NO PRIVATE VEHICLES WILL BE ALLOWED ON THE AIRPORT.
18. SPECIAL ACCESS REQUIREMENTS AND OPERATING LIMITATIONS ARE REQUIRED INSIDE THE SECURITY FENCE. THE CONTRACTOR SHALL DELINEATE WORK LIMITS WITHIN THESE AREAS USING ORANGE CONSTRUCTION FENCE. CONFINE MEN, EQUIPMENT AND MATERIALS OUTSIDE OF THE TAXIWAY OBJECT FREE AREA (TOFA) WHEN TAXIWAY IS ACTIVE.
19. CONTRACTOR SHALL PROVIDE AND MAINTAIN TEMPORARY LIGHTED BARRICADES EVERY 30 FEET BOTH SIDE OF HARD ROAD TO CLEARLY MARK THE DESIGNATED ACCESS ROUTES TO AFFECTED AREAS OF AIRPORT PROPERTY. CONTRACTOR SHALL CONTROL ACCESS TO THE WORKING AREA BY CONSTRUCTION VEHICLES AS DELINEATED ON THIS PLAN.
20. THE CONTRACTOR SHALL HAVE ACCESS TO THE SECURED AREA OF THE AIRPORT ONLY AT THE LOCATION DESIGNATED ON THE PLANS OR APPROVED BY THE OWNER. ALL OTHER ACCESS SHALL BE BY SPECIAL REQUEST AND SUBJECT TO APPROVAL BY THE OWNER. THE CONTRACTOR SHALL PROVIDE FLAGMEN TO COORDINATE AND CONTROL CONSTRUCTION TRAFFIC WHEN OPERATING ACROSS ANY ACTIVE TAXIWAY OR APRON.
21. THE CONTRACTOR SHALL PROVIDE, INSTALL AND MAINTAIN FLASHING LIGHTS AND BARRICADES ALONG TAXIWAY EDGES WHEREVER OPEN EXCAVATIONS OR IRREGULAR GRADES ARE LEFT WITHIN THE SAFETY AREA OF AN ACTIVE TAXIWAY OR WHERE TEMPORARY PAVEMENT CLOSURES OR AIRCRAFT LIMITATIONS ARE REQUIRED. BARRICADES SHALL BE PLACED IN A CONTINUOUS LINE OR AS NOTED ALONG THE AFFECTED PAVEMENT EDGE OR ACROSS THE PAVEMENT OF A CLOSED TAXIWAY. THE CONTRACTOR SHALL DAILY MAINTAIN THE LIGHTS AND BARRICADES IN AN OPERABLE CONDITION FOR THE DURATION OF THE PROJECT. THE CONTRACTOR SHALL FURNISH THE OWNER A CONTACT NUMBER FOR 24–HOUR MAINTENANCE OF LIGHTS AND BARRICADES.
22. THE CONTRACTOR SHALL PERFORM CONSTRUCTION OPERATIONS AS NECESSARY TO PREVENT ATTRACTION TO BIRDS CAUSED BY PONDED WATER AND GRASS SEED.
23. REFER TO THE GENERAL NOTES FOR REQUIREMENTS PERTAINING TO STORAGE OF CONSTRUCTION EQUIPMENT AND MATERIALS WHEN NOT IN USE.
24. THE CONTRACTOR SHALL COMPLY WITH ALL SECURITY REQUIREMENTS SPECIFIED HEREIN OR MANDATED BY FAA OR TSA. THE CONTRACTOR SHALL DESIGNATE IN WRITING TO THE OWNER THE NAME OF ITS "CONTRACTOR SECURITY OFFICER". THE CONTRACTOR SECURITY OFFICER SHALL REPRESENT THE CONTRACTOR ON THE SECURITY REQUIREMENTS OF THE CONTRACT.
25. THE CONTRACTOR'S SECURITY OFFICER SHALL BE RESPONSIBLE FOR BRIEFING ALL CONTRACTOR PERSONNEL ON THESE REQUIREMENTS. CONTRACTOR EMPLOYEES WHO REQUIRE ACCESS TO THE SECURE AREA OF THE AIRPORT SHALL ATTEND THE OWNER'S SECURITY TRAINING SESSION AND SHALL BE BRIEFED ON THESE REQUIREMENTS PRIOR TO WORKING IN THE CONSTRUCTION AREAS.
26. ALL CONTRACTOR PERSONNEL WHO REQUIRE ACCESS TO THE SECURE AREA OF THE AIRPORT SHALL HAVE OWNER ISSUED IDENTIFICATION BADGES DISPLAYED AT ALL TIMES WHEN WORKING INSIDE THE AIRCRAFT OPERATIONS AREA. THE AIRPORT ID PROGRAM IS UNDER CONSTANT REVIEW BY THE FAA AND THE AUTHORITY AND ALL CONTEMPORARY REQUIREMENTS WILL GOVERN. THE CONTRACTOR SHALL ASSIGN THE CONTRACTOR SECURITY OFFICER DESCRIBED ABOVE AS THE SINGLE POINT CONTACT FOR ALL IDENTIFICATION BADGING REQUIREMENTS.
27. THE CONTRACTOR SHALL ACQUAINT ITS SUPERVISORS AND EMPLOYEES WITH THE AIRPORT ACTIVITIES AND OPERATIONS THAT ARE INHERENT AT THIS AIRPORT AND SHALL CONDUCT ITS CONSTRUCTION ACTIVITIES TO CONFORM TO ALL ROUTINE AND EMERGENCY AIR TRAFFIC REQUIREMENTS AND TO THE GUIDELINES ON SAFETY.
28. ITEMS FOR CONTROL OF SAFETY DURING CONSTRUCTION SUCH AS VEHICLE LIGHTING, ETC. SHALL BE PAID FOR IN ACCORDANCE WITH SPECIFICATION S–102 AND SHALL BE CONSIDERED AS A SUBSIDIARY OBLIGATION FOR THE CONTRACTOR COVERED UNDER THESE ITEMS.
29. SEE PHASING PLANS SHEETS C06 THROUGH C10 FOR BARRICADE LOCATIONS.



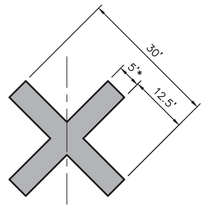
TEMPORARY SECURITY FENCE DETAIL
N.T.S



LOW LEVEL

AIRFIELD BARRICADE DETAIL

N.T.S.

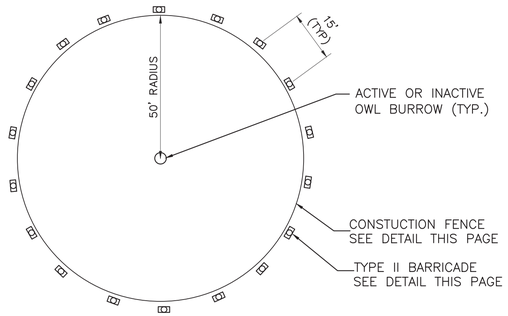


* FOR TEMPORARY X's THIS DIMENSION MAY BE CHANGED TO 4 FEET.

TEMPORARY TAXIWAY CLOSURE MARKER

CLOSED TAXIWAY MARKING NOTES:

1. TEMPORARY CLOSED TAXIWAY MARKINGS SHALL BE CONSTRUCTED OF AN EASILY REMOVABLE MATERIAL, SUCH AS PLYWOOD OR FABRIC, AND HELD IN PLACE WITH SAND BAGS PAINTED YELLOW. TEMPORARY CLOSED TAXIWAY MARKING SHALL BE YELLOW IN COLOR.
2. THE CONTRACTOR SHALL PLACE TEMPORARY CLOSED TAXIWAY MARKINGS ON THE CENTERLINE OF THE FACILITY TO BE CLOSED AS SHOWN ON PLANS OR AS DIRECTED BY THE AIRPORT ENGINEER.
3. NO PAYMENT WILL BE MADE FOR RELOCATIONS OF TEMPORARY CLOSED TAXIWAY MARKINGS.
4. PAYMENT FOR ITEM IS INCLUDED IN S–102. NO SEPARATE PAYMENT SHALL BE MADE FOR THIS ITEM.

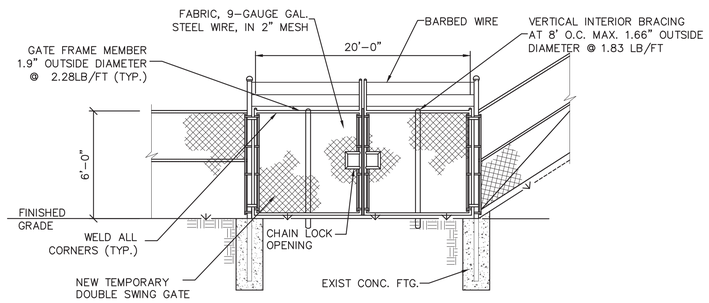


BURROW OWL FENCING PROTECTION DETAIL
N.T.S.

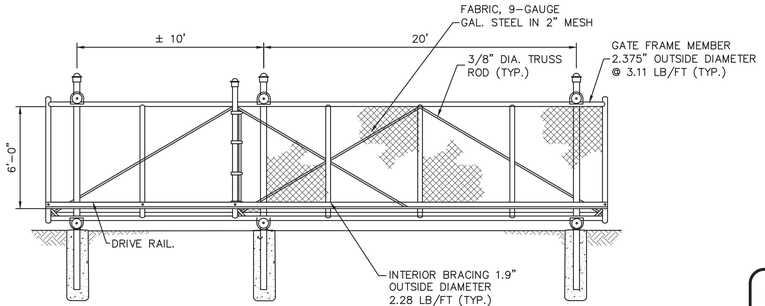
NOTE: IF FULL FENCE ENCLOSURE IS NOT USED IT WILL BE PAID AS A FRACTION

LOW LEVEL AIRFIELD BARRICADE NOTES:

1. BARRICADES SHALL BE PLACED AS SHOWN ON THE PHASING PLAN SHEETS C06 THROUGH C10 TO DELINEATE THE CONTRACTOR'S WORK AREAS.
2. BARRICADE SECTIONS CAN BE WHITE OR ORANGE WITH WHITE AND ORANGE RETRO–REFLECTIVE MARKING OR STICKERS. BARRICADES WILL BE LIGHTED AND FLAGGED.
3. ALL BARRICADES SHALL BE CHECKED VISUALLY FOR SIGNS OF WEAR AND TEAR ON A WEEKLY BASIS AND SHALL BE REPAIRED OR REPLACED WHEN DEEMED APPROPRIATE BY THE ENGINEER. THE CONDITIONS OF LIGHTING UNITS SHALL BE CHECKED DAILY. ALL LIGHT FIXTURES SHALL BE VERIFIED OPERATING BY THE CONTRACTOR ON A DAILY BASIS BEFORE THE CONTRACTOR CEASES OPERATION FOR THE DAY. THE AREAS AROUND ALL BARRICADES SHALL BE CLEANED AS DIRECTED IN THE GENERAL NOTES AND THE SAFETY NOTES.
4. BARRICADES ALONG ACTIVE APRON OR TAXIWAY PAVEMENT SHALL BE PLACED APPROXIMATELY 4 FEET FROM THE EDGE OF THE FULL STRENGTH PAVEMENT. BARRICADES SHALL BE PLACED IN A CONTINUOUS LINE.
5. ALTERNATE FORMS OF BARRICADES MAY BE PROPOSED BY THE CONTRACTOR WHICH MEET THESE FUNCTIONAL REQUIREMENTS. APPROVALS OF ANY SUCH SUBSTITUTION (IF GRANTED) SHALL BE BY THE OWNER AT NO ADDITIONAL COST TO THE OWNER.
6. THE FINAL LOCATION FOR THE BARRICADES SHALL BE ESTABLISHED IN THE FIELD WITH CONCURRENCE FROM THE OWNER.
7. THE CONTRACTOR SHALL FURNISH, INSTALL, MAINTAIN, RELOCATE AND REMOVE ALL BARRICADES. ALL WORK SHALL BE INCIDENTAL TO S–102 IN THE A.O.A.
8. THE CONTRACTOR SHALL DAILY MAINTAIN THE LIGHTS AND THE BARRICADES IN OPERABLE CONDITION. THE CONTRACTOR SHALL HAVE REPLACEMENT LIGHTS AND BATTERIES ON SITE AND SHALL REPLACE LIGHTS AND/OR BATTERIES WITHIN ONE HOUR OF NOTIFICATION BY THE ENGINEER OR AIRPORT PERSONNEL. CONTRACTOR SHALL FURNISH THE OWNER WITH THE NAME AND TELEPHONE NUMBER FOR AN ON–CALL REPRESENTATIVE 24 HOURS PER DAY, SEVEN DAYS PER WEEK TO REPLACE BATTERIES AND INOPERATIVE LIGHTS AND MAINTAIN THE BARRICADES.
9. FLASHING LIGHTS SHALL BE PLACED AT THE ENDS AND AT CORNERS OF EACH LINE OF BARRICADES, ALL OTHER LIGHTS ON BARRICADES SHALL BE STEADY–BURN.



TEMPORARY SECURITY DOUBLE SWING GATE
N.T.S.



TEMPORARY SLIDE GATE DETAIL
N.T.S.

NOTES:

1. TEMPORARY GATES TO BE REMOVED AFTER CONSTRUCTION IS COMPLETE. COST OF GATES ARE TO BE INCLUDED IN MOBILIZATION PAY ITEM. EXACT LOCATION TO BE COORDINATED WITH OWNER.
2. TEMPORARY GATE DETAIL SHOW MAX WIDTH, CONTRACTOR TO MEASURE ACTUAL DIMENSIONS IN FIELD PRIOR TO FABRICATION.

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1920 WEKIVA WAY, SUITE 200, WEST PALM BEACH, FL 33411
FBPE No. CA 00000696
JOB NO. 044693067

HILLERS ELECTRICAL ENGINEERING, INC.
23257 STATE ROAD 7, SUITE 100
BOCA RATON, FLORIDA 33428
(561) 451–0165 PHONE
(561) 451–4886 FAX

BID SET

State of Florida
Professional Engineer
License No. 62478
THOMAS F. O'DONNELL

DRAWN BY:	DATE:
MEM	01/22/2021
DESIGNED BY:	SCALE:
MEM	AS NOTED
CHECKED BY:	
TFO	
FIELD BOOK:	

CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

REVISIONS			
NO.	DATE	BY	CHK'D

PROJECT # 12455
TAXIWAY INTERSECTION IMPROVEMENTS
SAFETY NOTES AND DETAILS

SHEET NO.	OF
C05	41
TOTAL:	65
CAD FILE: 12444–C05–SAFE	
DRAWING FILE NO. 4–141–47	

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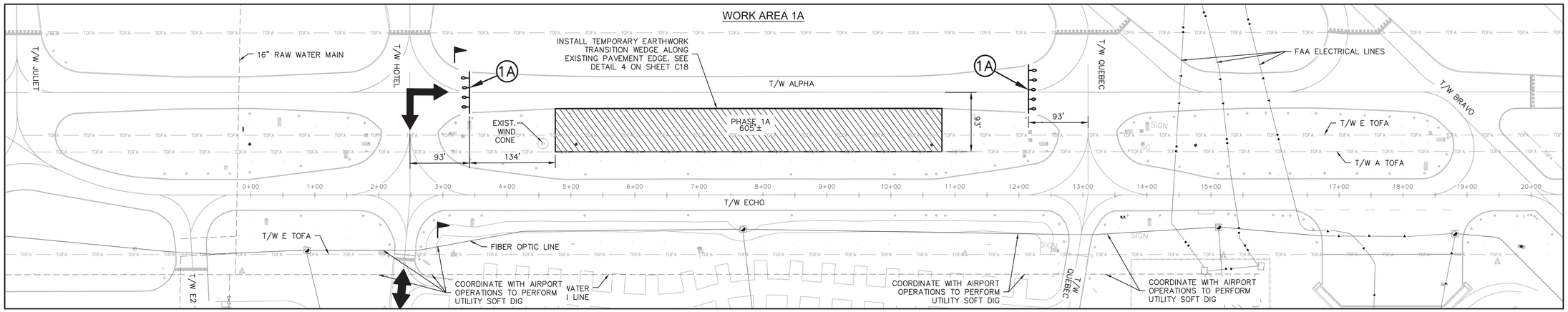

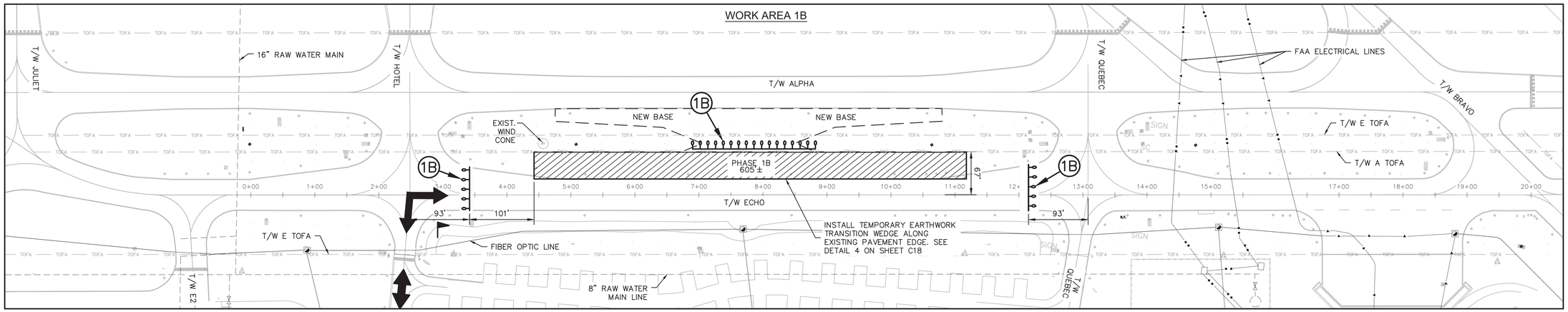

MOBILIZATION

MOBILIZATION DESCRIPTION

1. SUBMIT ALL SHOP DRAWINGS.
2. REMOVE, SALVAGE, AND STORE EXISTING AIRFIELD GATES.
3. INSTALL TEMPORARY CONSTRUCTION GATES.
4. PREPARE STAGING AREA INCLUDING BUT NOT LIMITED TO CONSTRUCTING STAGING AREA BASE.
5. INSTALL STAGING AREA FENCING AND OTHER SECURITY MEASURES

MOBILIZATION AIRCRAFT MOVEMENT

CONSTRUCTION IN THE WORK AREA WILL BE PERFORMED OUTSIDE OF AIRPORT SAFETY AREAS AND PROTECTED SURFACES. ALL AIRPORT INFRASTRUCTURE TO REMAIN OPEN. WORK WILL BE PERFORMED 8.5 HOURS PER DAY, MONDAY THROUGH FRIDAY, 7:30 AM AND 4:00 PM.

MOBILIZATION LIMIT OF WORK

THE LIMITS OF THIS WORK AREA WILL CONSIST OF ALL ACCESS POINTS AND THE CONTRACTOR'S STAGING AREA.

PHASE 1

WORK AREA A

WORK AREA A DESCRIPTION

1. INSTALL BARRICADES.
2. INSTALL EROSION AND SEDIMENTATION CONTROL MEASURES.
3. PERFORM CLEARING AND GRUBBING.
4. CONSTRUCT EMBANKMENT, SUBGRADE, SUBBASE, AND LIME ROCK BASE COURSE.
5. CONSTRUCT SHOULDERS.
6. PERFORM ELECTRICAL WORK.
7. INSTALL TEMPORARY EARTHWORK TRANSITION WEDGES
8. PERFORM UTILITY SOFT DIGS

WORK AREA A AIRCRAFT MOVEMENT

CONSTRUCTION IN THE WORK AREA SHOWN WILL REQUIRE THE CLOSURE OF EXISTING TAXIWAY A EAST OF TAXIWAY H AND WEST OF TAXIWAY Q. RUNWAY 9–27, RUNWAY 13–31, AND TAXIWAYS H AND Q TO REMAIN OPEN. TAXIWAY E TO REMAIN OPEN WITH OPERATIONS LIMITED TO ADG II OR SMALLER AIRCRAFT. WORK WILL BE PERFORMED 8.5 HOURS PER DAY, MONDAY THROUGH FRIDAY, 7:30 AM TO 4:00 PM. CONTRACTOR TO COORDINATE BARRICADE PLACEMENT AND EARTHWORK TRANSITION WEDGES AS SHOWN ON DETAIL 4 ON SHEET C18 WITH AIRPORT STAFF AND RESIDENT PROJECT REPRESENTATIVE. CONTRACTOR TO COORDINATE UTILITY SOFT DIGS WITH AIRPORT OPERATIONS 48 HOURS IN ADVANCE OF WORK. SOFT DIGS TO BE PERFORMED BETWEEN 10 PM AND 6 AM SUNDAY THROUGH THURSDAY.

WORK AREA A LIMIT OF WORK

THE LIMITS OF THIS WORK AREA ARE THE AREA FROM 93' EAST OF TAXIWAY H TO 93' WEST OF TAXIWAY Q, AND FROM TAXIWAY A SOUTH 93'.

WORK AREA A SEQUENCING

WORK IN THIS AREA WILL BE PERFORMED SEQUENTIALLY AFTER THE COMPLETION OF MOBILIZATION.

WORK AREA B

WORK AREA B DESCRIPTION

1. INSTALL BARRICADES.
2. INSTALL EROSION AND SEDIMENTATION CONTROL MEASURES.
3. PERFORM CLEARING AND GRUBBING.
4. CONSTRUCT EMBANKMENT, SUBGRADE, SUBBASE, AND LIME ROCK BASE COURSE.
5. CONSTRUCT SHOULDERS.
6. PERFORM ELECTRICAL DEMOLITION WORK.
7. INSTALL TEMPORARY EARTHWORK TRANSITION WEDGES

WORK AREA B AIRCRAFT MOVEMENT

CONSTRUCTION IN THE WORK AREA SHOWN WILL REQUIRE THE CLOSURE OF EXISTING TAXIWAY E EAST OF TAXIWAY H AND WEST OF TAXIWAY Q. RUNWAY 9–27, RUNWAY 13–31, AND TAXIWAYS A, H, AND Q TO REMAIN OPEN. WORK WILL BE PERFORMED 8.5 HOURS PER DAY, MONDAY THROUGH FRIDAY, 7:30 AM TO 4:00 PM. CONTRACTOR TO COORDINATE BARRICADE PLACEMENT AND EARTHWORK TRANSITION WEDGES AS SHOWN ON DETAIL 4 ON SHEET C18 WITH AIRPORT STAFF AND RESIDENT PROJECT REPRESENTATIVE.

WORK AREA B LIMIT OF WORK

THE LIMITS OF THIS WORK AREA ARE THE AREA FROM 93' EAST OF TAXIWAY H TO 93' WEST OF TAXIWAY Q, AND FROM TAXIWAY E NORTH 67'.

WORK AREA B SEQUENCING

WORK IN THIS AREA WILL BE PERFORMED SEQUENTIALLY AFTER THE COMPLETION OF PHASE 1 WORK AREA A.

LEGEND

- PHASE 1, AREA A
- PHASE 1, AREA B
- LOW LEVEL AIRFIELD BARRICADES
- 1A — APPROXIMATE BARRICADE LOCATION BY PHASE NUMBER
- TEMP. TAXIWAY CLOSURE MARKER SEE DETAIL SHEET C05
- HAUL ROUTE
- FLAGMAN

0 80' 160'

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600 N. PINE ISLAND RD, SUITE 450, PLANTATION, FL 33324
FBPE No.: CA 00000696
JOB NO. 044693067

HILLERS ELECTRICAL ENGINEERING, INC.
23257 STATE ROAD 7, SUITE 100
BOCA RATON, FLORIDA 33428
(561) 451-9140 PHONE
(561) 451-4886 FAX

BID SET

State of Florida
Professional Engineer
License No. 62478
THOMAS F. ODONNELL

DRAWN BY: MEM	DATE: 01/22/2021
DESIGNED BY: MEM	SCALE: AS NOTED
CHECKED BY: TFO	FIELD BOOK:

CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

REVISIONS

NO.	DATE	BY	CHK'D	DESCRIPTION

PROJECT # 12455
TAXIWAY INTERSECTION IMPROVEMENTS
PHASING PLAN 1 (1)

SHEET NO.	OF
C06	41
TOTAL:	65

CAD FILE: 12444-MULTI-PHAS1

DRAWING FILE NO. 4-141-47

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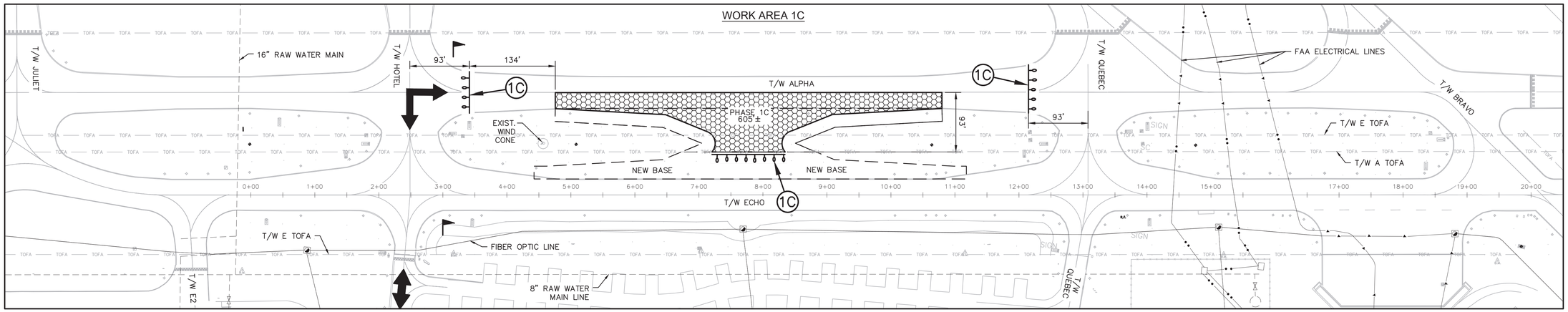
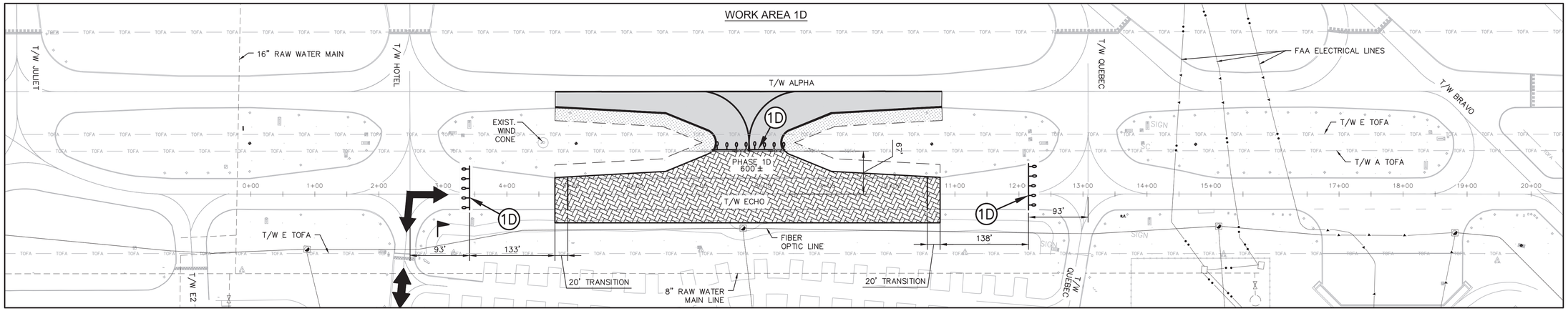




PHASE 1

WORK AREA C

WORK AREA C DESCRIPTION

1. INSTALL BARRICADES.
2. INSTALL EROSION AND SEDIMENTATION CONTROL MEASURES.
3. MILL BITUMINOUS ASPHALT AT INTERSECTION WITH EXISTING TAXIWAY A.
4. PERFORM ELECTRICAL INSTALLATION WORK.
5. REMOVE TEMPORARY EARTHWORK TRANSITION WEDGES
6. PAVE (P-401) ASPHALT.
7. APPLY TEMPORARY PAINT MARKING.
8. INSTALL TOPSOILING AND SODDING.

WORK AREA C AIRCRAFT MOVEMENT

CONSTRUCTION IN THE WORK AREA SHOWN WILL REQUIRE THE CLOSURE OF EXISTING TAXIWAY A EAST OF TAXIWAY H AND WEST OF TAXIWAY Q. RUNWAY 9-27, RUNWAY 13-31, AND TAXIWAYS H AND Q TO REMAIN OPEN. TAXIWAY E TO REMAIN OPEN WITH OPERATIONS LIMITED TO ADG II OR SMALLER AIRCRAFT. WORK WILL BE PERFORMED 8.5 HOURS PER DAY, MONDAY THROUGH FRIDAY, 7:30 AM TO 4:00 PM. CONTRACTOR TO COORDINATE BARRICADE PLACEMENT WITH AIRPORT STAFF AND RESIDENT PROJECT REPRESENTATIVE.

WORK AREA C LIMIT OF WORK

THE LIMITS OF THIS WORK AREA ARE THE AREA FROM 93' EAST OF TAXIWAY H TO 93' WEST OF TAXIWAY Q, AND FROM TAXIWAY A SOUTH 93'.

WORK AREA C SEQUENCING

WORK IN THIS AREA WILL BE PERFORMED SEQUENTIALLY AFTER THE COMPLETION OF PHASE 1 WORK AREA B.

WORK AREA D

WORK AREA D DESCRIPTION

1. INSTALL BARRICADES.
2. INSTALL EROSION AND SEDIMENTATION CONTROL MEASURES.
3. PERFORM CLEARING AND GRUBBING
4. PERFORM EARTHWORK
5. CONSTRUCT SHOULDERS
6. MILL BITUMINOUS ASPHALT AT INTERSECTION WITH EXISTING TAXIWAY E.
7. PERFORM ELECTRICAL INSTALLATION WORK.
8. REMOVE TEMPORARY EARTHWORK TRANSITION WEDGES.
9. PAVE (P-401) ASPHALT.
10. APPLY TEMPORARY PAINT MARKING.
11. INSTALL TOP SOILING AND SODDING.

WORK AREA D AIRCRAFT MOVEMENT

CONSTRUCTION IN THE WORK AREA SHOWN WILL REQUIRE THE CLOSURE OF EXISTING TAXIWAY E EAST OF TAXIWAY H AND WEST OF TAXIWAY Q. RUNWAY 9-27, RUNWAY 13-31, AND TAXIWAYS A, H, AND Q TO REMAIN OPEN. WORK WILL BE PERFORMED 8.5 HOURS PER DAY, MONDAY THROUGH FRIDAY, 7:30 AM TO 4:00 PM. CONTRACTOR TO COORDINATE BARRICADE PLACEMENT WITH AIRPORT STAFF AND RESIDENT PROJECT REPRESENTATIVE.

WORK AREA D LIMIT OF WORK

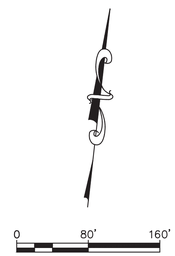
THE LIMITS OF THIS WORK AREA ARE THE AREA FROM 93' EAST OF TAXIWAY H TO 93' WEST OF TAXIWAY Q, AND FROM TAXIWAY E NORTH 67'.

WORK AREA D SEQUENCING

WORK IN THIS AREA WILL BE PERFORMED SEQUENTIALLY AFTER THE COMPLETION OF PHASE 1 WORK AREA C.

LEGEND

- PHASE 1, AREA C
- PHASE 1, AREA D
- LOW LEVEL AIRFIELD BARRICADES
- 1A — APPROXIMATE BARRICADE LOCATION BY PHASE NUMBER
- TEMP. TAXIWAY CLOSURE MARKER SEE DETAIL SHEET C05
- HAUL ROUTE
- FLAGMAN



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600 N. PINE ISLAND RD, SUITE 450, PLANTATION, FL 33324
FBPE No.: CA 00000696
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HILLERS ELECTRICAL ENGINEERING, INC.
23257 STATE ROAD 7, SUITE 100
BOCA RATON, FLORIDA 33428
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THOMAS F. ODONNELL

DRAWN BY: MEM	DATE: 01/22/2021		
DESIGNED BY: MEM	SCALE: AS NOTED		
CHECKED BY: TFO	FIELD BOOK:		

CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

REVISIONS

NO.	DATE	BY	CHK'D	DESCRIPTION

PROJECT # 12455
TAXIWAY INTERSECTION IMPROVEMENTS
PHASING PLAN 1 (2)

SHEET NO.	OF
C07	41

TOTAL: 65

CAD FILE: 12444-MULTI-PHAS1

DRAWING FILE NO. 4-141-47

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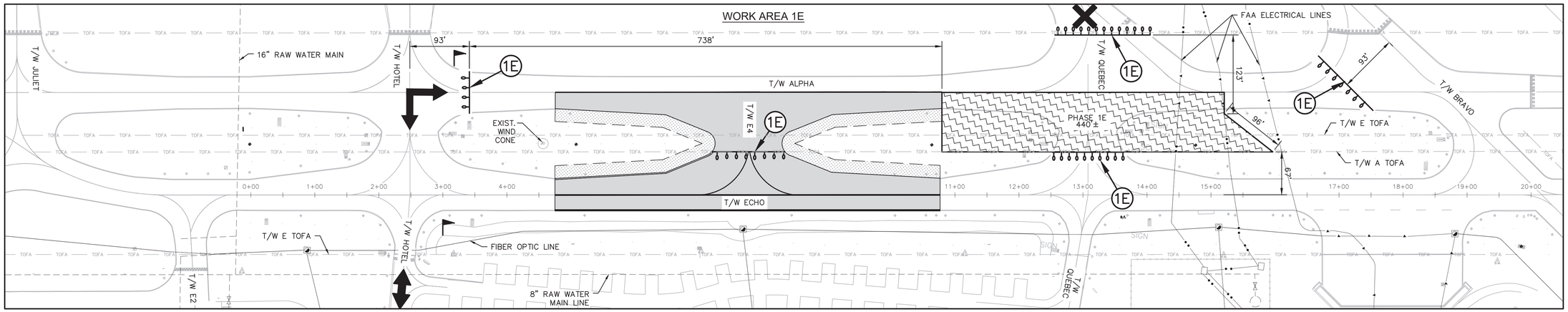

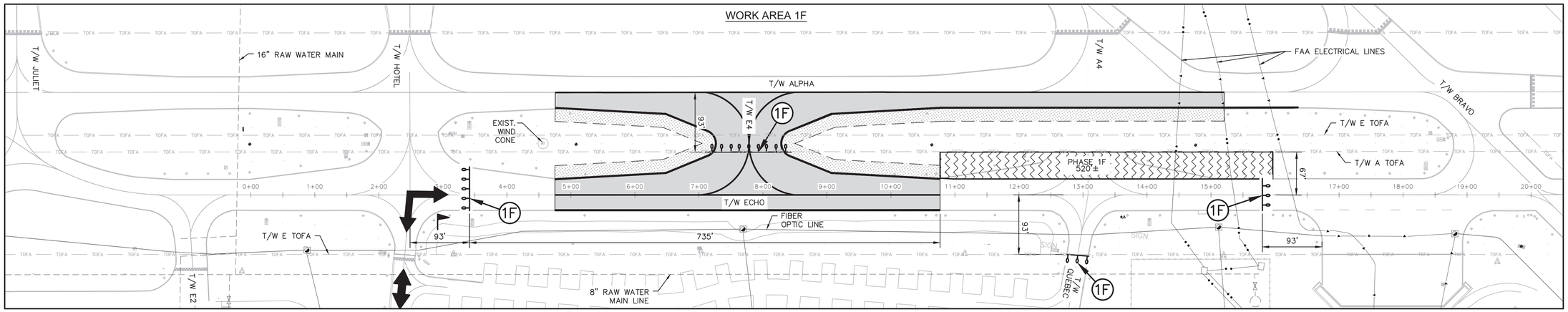

PHASE 1

WORK AREA E

WORK AREA E DESCRIPTION

1. INSTALL BARRICADES AND TAXIWAY CLOSURE MARKER.
2. INSTALL EROSION AND SEDIMENTATION CONTROL MEASURES.
3. PERFORM FULL DEPTH PAVEMENT REMOVAL AND MILL BITUMINOUS ASPHALT ON EXISTING TAXIWAY ALPHA.
4. PERFORM ELECTRICAL WORK.
5. PERFORM EARTHWORK.
6. PAVE (P-401) ASPHALT.
7. APPLY TEMPORARY PAINT MARKING.
8. INSTALL TOPSOILING AND SODDING.

WORK AREA E AIRCRAFT MOVEMENT

CONSTRUCTION IN THE WORK AREA SHOWN WILL REQUIRE THE CLOSURE OF EXISTING TAXIWAY Q SOUTH OF RUNWAY 9-27 AND NORTH OF TAXIWAY E, TAXIWAY A EAST OF TAXIWAY H AND WEST OF TAXIWAY B, AND TAXIWAY E4. RUNWAY 9-27, RUNWAY 13-31, AND TAXIWAYS H, AND B TO REMAIN OPEN. TAXIWAY E TO REMAIN OPEN WITH OPERATIONS LIMITED TO ADG II OR SMALLER AIRCRAFT. WORK WILL BE PERFORMED 8.5 HOURS PER DAY, MONDAY THROUGH FRIDAY, 7:30 AM TO 4:00 PM. CONTRACTOR TO COORDINATE BARRICADE PLACEMENT WITH AIRPORT STAFF AND RESIDENT PROJECT REPRESENTATIVE.

WORK AREA E LIMIT OF WORK

THE LIMITS OF THIS WORK AREA ARE THE AREA FROM 93' EAST OF TAXIWAY H TO 93' WEST OF TAXIWAY B, AND FROM 250' SOUTH OF RUNWAY 9-27 TO 67' NORTH OF TAXIWAY E.

WORK AREA E SEQUENCING

WORK IN THIS AREA WILL BE PERFORMED SEQUENTIALLY AFTER THE COMPLETION OF PHASE 1 WORK AREA D.

WORK AREA F

WORK AREA F DESCRIPTION

1. INSTALL BARRICADES
2. INSTALL EROSION AND SEDIMENTATION CONTROL MEASURES.
3. PERFORM FULL DEPTH PAVEMENT REMOVAL.
4. PERFORM ELECTRICAL WORK.
5. PERFORM EARTHWORK.
6. APPLY TEMPORARY PAINT MARKINGS.
7. INSTALL TOPSOILING AND SODDING.

WORK AREA F AIRCRAFT MOVEMENT

CONSTRUCTION IN THE WORK AREA SHOWN WILL REQUIRE THE CLOSURE OF EXISTING TAXIWAY Q SOUTH OF TAXIWAY A AND NORTH OF THE TAXIWAY Q NON-MOVEMENT LINE, TAXIWAY E EAST OF TAXIWAY EXISTING H AND WEST THE HOLD BAY, AND TAXIWAY E4. RUNWAY 9-27, RUNWAY 13-31, AND TAXIWAYS A, H, AND B, AND THE HOLD BAY TO REMAIN OPEN. WORK WILL BE PERFORMED 8.5 HOURS PER DAY, MONDAY THROUGH FRIDAY, 7:30 AM TO 4:00 PM. CONTRACTOR TO COORDINATE BARRICADE PLACEMENT WITH AIRPORT STAFF AND RESIDENT PROJECT REPRESENTATIVE

WORK AREA F LIMIT OF WORK

THE LIMITS OF THIS WORK AREA ARE THE AREA FROM 93' EAST OF TAXIWAY H TO 93' WEST OF THE HOLD BAY APRON, AND FROM 93' SOUTH OF TAXIWAY A TO THE TAXIWAY Q NON-MOVEMENT LINE.

WORK AREA F SEQUENCING

WORK IN THIS AREA WILL BE PERFORMED SEQUENTIALLY AFTER THE COMPLETION OF PHASE 1 WORK AREA E.

LEGEND

- PHASE 1, AREA E
- PHASE 1, AREA F
- LOW LEVEL AIRFIELD BARRICADES
- 1A — APPROXIMATE BARRICADE LOCATION BY PHASE NUMBER
- TEMP. TAXIWAY CLOSURE MARKER SEE DETAIL SHEET C05
- HAUL ROUTE
- FLAGMAN

0 80' 160'

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DRAWN BY:	DATE:
MEM	01/22/2021
DESIGNED BY:	SCALE:
MEM	AS NOTED
CHECKED BY:	
TFO	
FIELD BOOK:	

CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

REVISIONS			
NO.	DATE	BY	CHK'D

PROJECT # 12455
TAXIWAY INTERSECTION IMPROVEMENTS
PHASING PLAN 1 (3)

SHEET NO.	OF
C08	41
TOTAL:	65
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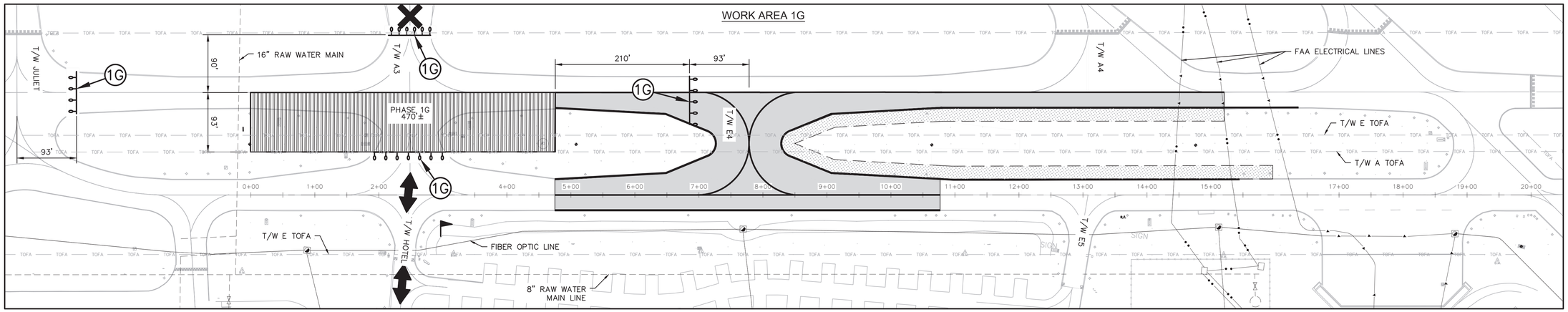

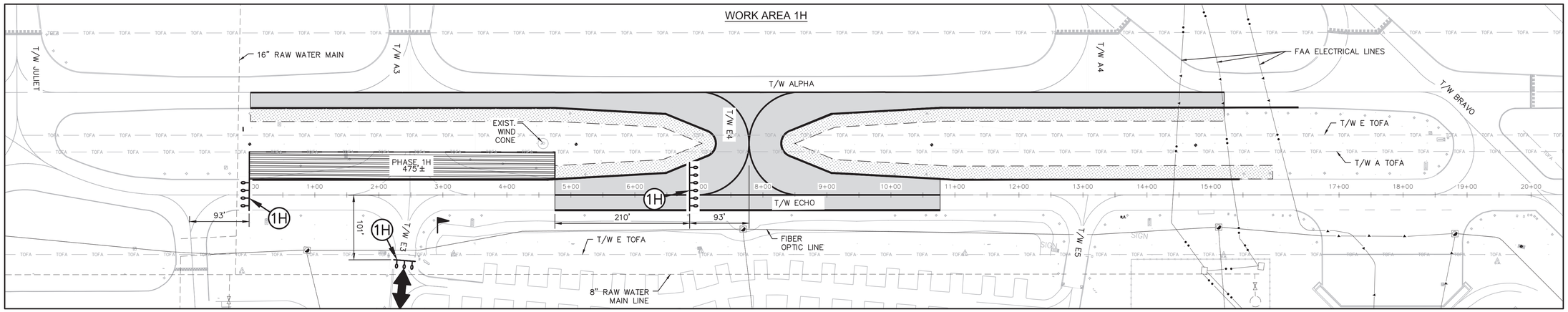

PHASE 1

WORK AREA G

WORK AREA G DESCRIPTION

1. INSTALL BARRICADES AND TAXIWAY CLOSURE MARKER.
2. INSTALL EROSION AND SEDIMENTATION CONTROL MEASURES.
3. PERFORM FULL DEPTH PAVEMENT REMOVAL AND MILL BITUMINOUS ASPHALT ON EXISTING TAXIWAY ALPHA.
4. PERFORM ELECTRICAL WORK.
5. PERFORM EARTHWORK.
6. PAVE (P-401) ASPHALT.
7. APPLY TEMPORARY PAINT MARKINGS.
8. INSTALL TOPSOILING AND SODDING.

WORK AREA G AIRCRAFT MOVEMENT

CONSTRUCTION IN THE WORK AREA SHOWN WILL REQUIRE THE CLOSURE OF EXISTING TAXIWAY H SOUTH OF RUNWAY 9-27 AND NORTH TAXIWAY E, TAXIWAY A EAST OF TAXIWAY EXISTING J AND WEST OF TAXIWAY E4. RUNWAY 9-27, RUNWAY 13-31, AND TAXIWAYS J, E4, AND B TO REMAIN OPEN. TAXIWAY E TO REMAIN OPEN WITH OPERATIONS LIMITED TO ADG II OR SMALLER AIRCRAFT. WORK WILL BE PERFORMED 8.5 HOURS PER DAY, MONDAY THROUGH FRIDAY, 7:30 AM TO 4:00 PM. CONTRACTOR TO COORDINATE BARRICADE PLACEMENT WITH AIRPORT STAFF AND RESIDENT PROJECT REPRESENTATIVE.

WORK AREA G LIMIT OF WORK

THE LIMITS OF THIS WORK AREA ARE THE AREA FROM 93' EAST OF TAXIWAY J TO 93' WEST OF TAXIWAY E4, AND FROM 250' SOUTH OF RUNWAY 9-27 TO 93' SOUTH OF TAXIWAY A.

WORK AREA G SEQUENCING

WORK IN THIS AREA WILL BE PERFORMED SEQUENTIALLY AFTER THE COMPLETION OF PHASE 1 WORK AREA F.

WORK AREA H

WORK AREA H DESCRIPTION

1. INSTALL BARRICADES
2. INSTALL EROSION AND SEDIMENTATION CONTROL MEASURES.
3. PERFORM FULL DEPTH PAVEMENT REMOVAL.
4. PERFORM ELECTRICAL WORK.
5. PERFORM EARTHWORK.
6. APPLY TEMPORARY PAINT MARKINGS.
7. INSTALL TOPSOILING AND SODDING.

WORK AREA H AIRCRAFT MOVEMENT

CONSTRUCTION IN THE WORK AREA SHOWN WILL REQUIRE THE CLOSURE OF EXISTING TAXIWAY H SOUTH TAXIWAY A AND NORTH OF THE TAXIWAY H NON-MOVEMENT LINE, TAXIWAY E EAST OF TAXIWAY E2 AND WEST OF TAXIWAY E4. RUNWAY 9-27, RUNWAY 13-31, AND TAXIWAYS A, E4, AND E (BEYOND THE LIMITS OF WORK) TO REMAIN OPEN. WORK WILL BE PERFORMED 8.5 HOURS PER DAY, MONDAY THROUGH FRIDAY, 7:30 AM TO 4:00 PM. CONTRACTOR TO COORDINATE BARRICADE PLACEMENT WITH AIRPORT STAFF AND RESIDENT PROJECT REPRESENTATIVE.

WORK AREA H LIMIT OF WORK

THE LIMITS OF THIS WORK AREA ARE THE AREA FROM 93' EAST OF TAXIWAY E2 TO 93' WEST OF TAXIWAY E4, AND FROM 93' SOUTH OF TAXIWAY A TO THE TAXIWAY H NON-MOVEMENT LINE.

WORK AREA H SEQUENCING

WORK IN THIS AREA WILL BE PERFORMED SEQUENTIALLY AFTER THE COMPLETION OF PHASE 1 WORK AREA G.

LEGEND

- PHASE 1, AREA G
- PHASE 1, AREA H
- LOW LEVEL AIRFIELD BARRICADES
- 1A — APPROXIMATE BARRICADE LOCATION BY PHASE NUMBER
- TEMP. TAXIWAY CLOSURE MARKER SEE DETAIL SHEET C05
- HAUL ROUTE
- FLAGMAN

0 80' 160'

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600 N. PINE ISLAND RD, SUITE 450, PLANTATION, FL 33324
FBPE No. CA 00000696
JOB NO. 044693067

HILLERS ELECTRICAL ENGINEERING, INC.
23257 STATE ROAD 7, SUITE 100
BOCA RATON, FLORIDA 33428
(561) 451-9165 PHONE
(561) 451-4886 FAX

State of Florida
Professional Engineer
License No. 62478
THOMAS F. O'DONNELL

DRAWN BY: MEM	DATE: 01/22/2021
DESIGNED BY: MEM	SCALE: AS NOTED
CHECKED BY: TFO	FIELD BOOK:

CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

REVISIONS

NO.	DATE	BY	CHK'D	DESCRIPTION

PROJECT # 12455
TAXIWAY INTERSECTION IMPROVEMENTS
PHASING PLAN 1 (4)

SHEET NO.	OF
C09	41

TOTAL: 65

CAD FILE: 12444-MULTI-PHAS1

DRAWING FILE NO. 4-141-47

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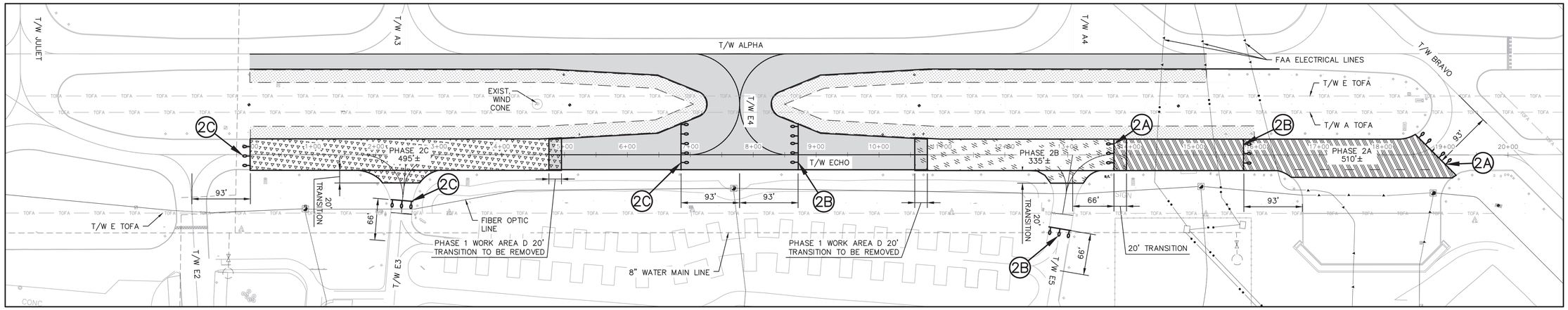
WORK AREA 2 A-C



PHASE 2

WORK AREA A

WORK AREA A DESCRIPTION

1. INSTALL BARRICADES.
2. MILL BITUMINOUS ASPHALT AS REQUIRED WITHIN LIMITS OF WORK.
3. PERFORM ELECTRICAL DEMOLITION AND INSTALLATION WORK.
4. PAVE (P-401) ASPHALT.
5. APPLY TEMPORARY PAINT MARKING.
6. INSTALL TOPSOILING AND SODDING.

WORK AREA A AIRCRAFT MOVEMENT

CONSTRUCTION IN THE WORK AREA SHOWN WILL REQUIRE THE CLOSURE OF THE RUNUP AREA AND TAXIWAY E EAST OF TAXIWAY E5 AND WEST OF TAXIWAY B. RUNWAY 9-27, RUNWAY 13-31, TAXIWAYS A, E (BEYOND THIS WORK AREA), B, E3, E4 AND E5 ARE TO REMAIN OPEN. WORK WILL BE PERFORMED 8.5 HOURS PER DAY, MONDAY THROUGH FRIDAY, 7:30 AM TO 4:00 PM. CONTRACTOR TO COORDINATE BARRICADE PLACEMENT WITH AIRPORT STAFF AND RESIDENT PROJECT REPRESENTATIVE.

WORK AREA A LIMIT OF WORK

THE LIMITS OF THIS WORK AREA ARE THE AREA FROM 66' EAST OF TAXIWAY E5 TO 93' WEST OF TAXIWAY B.

WORK AREA A SEQUENCING

WORK IN THIS AREA WILL BE PERFORMED SEQUENTIALLY AFTER THE COMPLETION OF PHASE 1 WORK AREA H.

WORK AREA B

WORK AREA B DESCRIPTION

1. INSTALL BARRICADES.
2. MILL BITUMINOUS ASPHALT AS REQUIRED WITHIN LIMITS OF WORK.
3. PERFORM ELECTRICAL DEMOLITION AND INSTALLATION WORK.
4. PAVE (P-401) ASPHALT.
5. APPLY TEMPORARY PAINT MARKING.
6. INSTALL TOPSOILING AND SODDING.

WORK AREA B AIRCRAFT MOVEMENT

CONSTRUCTION IN THE WORK AREA SHOWN WILL REQUIRE THE CLOSURE OF TAXIWAY E EAST OF E4 AND WEST OF THE RUNUP AREA AND TAXIWAY E5 NORTH OF ITS NON-MOVEMENT LINE. RUNWAY 9-27, RUNWAY 13-31, AND TAXIWAYS A, E (BEYOND THIS WORK AREA), B, E2, E3 AND E4 ARE TO REMAIN OPEN. WORK WILL BE PERFORMED 8.5 HOURS PER DAY, MONDAY THROUGH FRIDAY, 7:30 AM TO 4:00 PM. CONTRACTOR TO COORDINATE BARRICADE PLACEMENT WITH AIRPORT STAFF AND RESIDENT PROJECT REPRESENTATIVE.

WORK AREA B LIMIT OF WORK

THE LIMITS OF THIS WORK AREA ARE THE AREA FROM 93' EAST OF TAXIWAY E4 TO 93' WEST OF THE RUNUP AREA AND FROM TAXIWAY E SOUTH TO THE NON-MOVEMENT LINE.

WORK AREA B SEQUENCING

WORK IN THIS AREA WILL BE PERFORMED SEQUENTIALLY AFTER THE COMPLETION OF PHASE 2 WORK AREA A.

WORK AREA C

WORK AREA C DESCRIPTION

1. INSTALL BARRICADES.
2. MILL BITUMINOUS ASPHALT AS REQUIRED WITHIN LIMITS OF WORK.
3. PERFORM ELECTRICAL DEMOLITION AND INSTALLATION WORK.
4. PAVE (P-401) ASPHALT.
5. APPLY TEMPORARY PAINT MARKING.
6. INSTALL TOPSOILING AND SODDING.

WORK AREA C AIRCRAFT MOVEMENT

CONSTRUCTION IN THE WORK AREA SHOWN WILL REQUIRE THE CLOSURE OF TAXIWAY E EAST OF TAXIWAY E2 AND WEST OF NEW TAXIWAY E4 AND TAXIWAY E3 NORTH OF ITS NON-MOVEMENT LINE. RUNWAY 9-27, RUNWAY 13-31, TAXIWAYS A, E (BEYOND THIS WORK AREA), B, E2, E4 AND E5 ARE TO REMAIN OPEN. WORK WILL BE PERFORMED 8.5 HOURS PER DAY, MONDAY THROUGH FRIDAY, 7:30 AM TO 4:00 PM. CONTRACTOR TO COORDINATE BARRICADE PLACEMENT WITH AIRPORT STAFF AND RESIDENT PROJECT REPRESENTATIVE.

WORK AREA C LIMIT OF WORK

THE LIMITS OF THIS WORK AREA ARE THE AREA FROM 93' EAST OF TAXIWAY E2 TO 93' WEST OF TAXIWAY E4 AND FROM TAXIWAY E SOUTH TO THE TAXIWAY E3 NON-MOVEMENT LINE.

WORK AREA C SEQUENCING

WORK IN THIS AREA WILL BE PERFORMED SEQUENTIALLY AFTER THE COMPLETION OF PHASE 2 WORK AREA B.

LEGEND

- PHASE 2, AREA A
- PHASE 2, AREA B
- PHASE 2, AREA C
- LOW LEVEL AIRFIELD BARRICADES
- 1A — APPROXIMATE BARRICADE LOCATION BY PHASE NUMBER
- TEMP. TAXIWAY CLOSURE MARKER SEE DETAIL SHEET C05
- HAUL ROUTE
- FLAGMAN

0 80' 160'

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600 N. PINE ISLAND RD, SUITE 450, PLANTATION, FL 33324
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HILLERS ELECTRICAL ENGINEERING, INC.
23257 STATE ROAD 7, SUITE 100
BOCA RATON, FLORIDA 33428
(561) 451-9165 PHONE
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BID SET

State of Florida
Professional Engineer
License No. 62478
THOMAS F. ODONNELL

DRAWN BY: MEM | DESIGNED BY: MEM | DATE: 01/22/2021 | SCALE: AS NOTED | CHECKED BY: TFO | FIELD BOOK:

CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

REVISIONS

NO.	DATE	BY	CHK'D	DESCRIPTION

PROJECT # 12455
TAXIWAY INTERSECTION IMPROVEMENTS
PHASING PLAN 2

SHEET NO. C10 OF 41
TOTAL: 65
CAD FILE: 12444-C10-PHAS2
DRAWING FILE NO. 4-141-47

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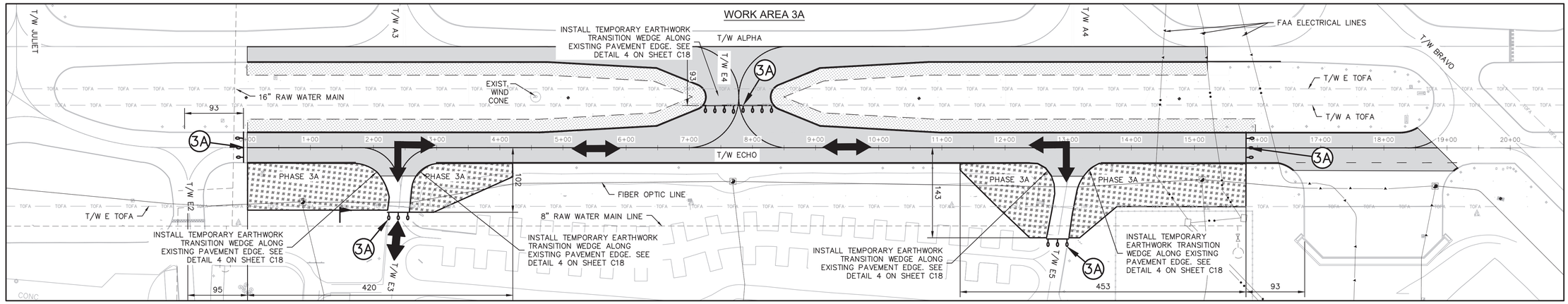

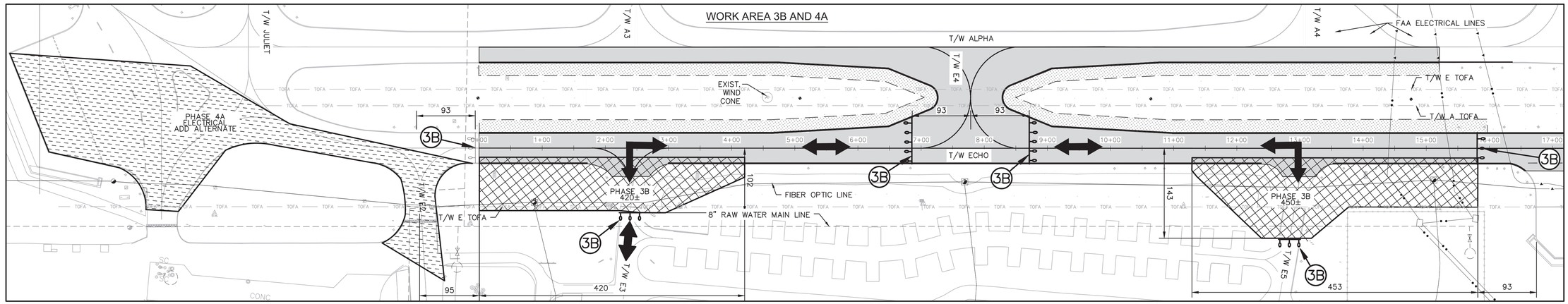

PHASE 3

WORK AREA A

WORK AREA A DESCRIPTION

1. INSTALL BARRICADES.
2. INSTALL EROSION AND SEDIMENTATION CONTROL MEASURES.
3. PERFORM CLEARING AND GRUBBING.
4. CONSTRUCT EMBANKMENT SUBGRADE, SUBBASE, AND LIME ROCK BASE COURSE.
5. PERFORM ELECTRICAL WORK.
6. INSTALL TEMPORARY EARTHWORK TRANSITION WEDGES

WORK AREA A AIRCRAFT MOVEMENT

CONSTRUCTION IN THE WORK AREA SHOWN WILL REQUIRE THE CLOSURE OF EXISTING TAXIWAY E3 AND E5 SOUTH OF TAXIWAY E AND NORTH OF THE NON–MOVEMENT LINE, TAXIWAY E EAST OF TAXIWAY E2 AND WEST OF THE RUNUP APRON, AND TAXIWAY E4. RUNWAY 9–27, RUNWAY 13–31, AND TAXIWAY A ARE TO REMAIN OPEN. WORK WILL BE PERFORMED 8 HOURS PER NIGHT, SUNDAY THROUGH FRIDAY, 10:00 PM. TO 6:00 AM. ALL AREAS WILL BE OPENED BETWEEN 6:00 AM AND 10:00 PM MONDAY THROUGH THURSDAY AND 6:00 AM FRIDAY TO 10:00 PM SUNDAY. CONTRACTOR TO COORDINATE BARRICADE PLACEMENT AND TEMPORARY EARTHWORK WEDGES AS SHOWN ON DETAIL 4 ON SHEET C18 WITH AIRPORT STAFF AND RESIDENT PROJECT REPRESENTATIVE.

WORK AREA A LIMIT OF WORK

THE LIMITS OF THIS WORK AREA ARE THE AREA FROM 93' EAST OF TAXIWAY E2 TO 93' WEST OF RUNUP APRON AND FROM TAXIWAY E SOUTH TO THE NON–MOVEMENT LINES.

WORK AREA A SEQUENCING

WORK IN THIS AREA WILL BE PERFORMED SEQUENTIALLY AFTER THE COMPLETION OF PHASE 2 WORK AREA C.

WORK AREA B

WORK AREA B DESCRIPTION

1. INSTALL BARRICADES.
2. INSTALL EROSION AND SEDIMENTATION CONTROL MEASURES.
3. MILL BITUMINOUS ASPHALT FROM THE EDGE OF TAXIWAY E TO THE TAXIWAY E3 AND E5 NON–MOVEMENT LINE.
4. PERFORM ELECTRICAL INSTALLATION WORK.
5. REMOVE TEMPORARY EARTHWORK TRANSITION WEDGES
6. PAVE (P–401) ASPHALT.
7. APPLY TEMPORARY PAINT MARKING.
8. INSTALL TOPSOILING AND SODDING.

WORK AREA B AIRCRAFT MOVEMENT

CONSTRUCTION IN THE WORK AREA SHOWN WILL REQUIRE THE SEPARATE CLOSURES OF EXISTING TAXIWAY E3 AND E5 SOUTH OF TAXIWAY E AND NORTH OF THE NON–MOVEMENT LINE. THE WORK IN THIS AREA WILL BE DONE IN TWO PARTS. TAXIWAY E5 SHOULD BE CONDUCTED FIRST WHILE TAXIWAY E3 AND TAXIWAY E WEST OF TAXIWAY E4 WILL REMAIN OPEN. ALL BARRICADES EAST OF TAXIWAY E4 WILL BE IN PLACE. ONCE TAXIWAY E5 IS COMPLETED, THE TAXIWAY E3 WORK WILL BEGIN. DURING THE TAXIWAY E3 WORK, TAXIWAY E5 AND TAXIWAY E EAST OF TAXIWAY E4 WILL REMAIN OPEN. ALL BARRICADES WEST OF TAXIWAY E4 WILL BE IN PLACE. WORK ON RUNWAY 9–27, RUNWAY 13–31, AND TAXIWAY A ARE TO REMAIN OPEN. WORK WILL BE PERFORMED 8 HOURS PER NIGHT, SUNDAY THROUGH FRIDAY, 10:00 PM. TO 6:00 AM. TAXIWAYS WILL BE OPENED BETWEEN 6:00 AM AND 10:00 PM MONDAY THROUGH THURSDAY AND 6:00 AM TO 10:00 PM SUNDAY. PAVING WILL BE PERFORMED ON TWO CONSECUTIVE NIGHTS. PAINT MARKINGS WILL BE APPLIED ON TAXIWAY CENTERLINES AND HOLD BARS AFTER FIRST LIFT. CONTRACTOR TO COORDINATE BARRICADE PLACEMENT WITH AIRPORT STAFF AND RESIDENT PROJECT REPRESENTATIVE.

WORK AREA B LIMIT OF WORK

THE LIMITS OF THIS WORK AREA ARE THE AREA FROM 93' EAST OF TAXIWAY E2 TO 93' WEST OF RUNUP APRON AND FROM TAXIWAY E SOUTH TO THE NON–MOVEMENT LINES.

WORK AREA B SEQUENCING

WORK IN THIS AREA WILL BE PERFORMED SEQUENTIALLY AFTER THE COMPLETION OF PHASE 3 WORK AREA A.

PHASE 4

WORK AREA A

WORK AREA A DESCRIPTION

1. ALLOW ASPHALT TO CURE 28 DAYS
2. INSTALL BARRICADES AS DIRECTED BY AIRPORT STAFF.
3. APPLY FINAL PAINT MARKING.
4. CORRECT EDGE CONDITIONS BY INSTALL FILL ALONG EDGES OF PAVEMENT.
5. PERFORM ADD ALTERNATE ELECTRICAL WORK
6. PERFORM PUNCHLIST.

WORK AREA A AIRCRAFT MOVEMENT

CONSTRUCTION IN THE WORK AREA SHOWN WILL REQUIRE THE PERIODIC CLOSURES OF TAXIWAYS A, E, E3, E4, E5 A3 A4, AND THE RUNUP AREA. THE EXACT LIMITS OF WORK AREAS WILL BE DETERMINED IN THE FIELD. CLOSURES WILL BE "ROLLING". THE EXACT LIMITS OF DAILY WORK AREAS WILL BE DETERMINED IN THE FIELD. A MAXIMUM OF ONE TAXIWAY CROSSING MAY BE CLOSED AT ANY GIVEN TIME. RUNWAYS 9–27 AND 13–31 ARE TO REMAIN OPEN. WORK WILL BE PERFORMED 8.5 HOURS PER DAY, MONDAY THROUGH FRIDAY, 7:30 AM TO 4:00 PM. CONTRACTOR TO COORDINATE BARRICADE AND CLOSURE MARKING PLACEMENT WITH AIRPORT STAFF AND RESIDENT PROJECT REPRESENTATIVE.

WORK AREA A LIMIT OF WORK

THE EXACT LIMITS OF WORK AREAS WILL BE DETERMINED IN THE FIELD. CONTRACTOR WILL COORDINATE WITH AIRPORT STAFF AND RESIDENT PROJECT REPRESENTATIVE.

WORK AREA A SEQUENCING

WORK IN THIS AREA WILL BE PERFORMED A MINIMUM OF 28 DAYS AFTER THE COMPLETION OF PAVING AND SEQUENTIALLY AFTER THE COMPLETION OF PHASE 3 WORK AREA B.

LEGEND

- PHASE 3, AREA A
- PHASE 3, AREA B
- LOW LEVEL AIRFIELD BARRICADES
- 1A — APPROXIMATE BARRICADE LOCATION BY PHASE NUMBER
- TEMP. TAXIWAY CLOSURE MARKER SEE DETAIL SHEET C05
- HAUL ROUTE
- FLAGMAN

0 80' 160'

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600 N. PINE ISLAND RD, SUITE 450, PLANTATION, FL 33324
FBPE No. CA 00000696
JOB NO. 044693067

HILLERS ELECTRICAL ENGINEERING, INC.
23257 STATE ROAD 7, SUITE 100
BOCA RATON, FLORIDA 33428
(561) 451-9165 PHONE
(561) 451-4866 FAX

State of Florida
Professional Engineer
License No. 62478
THOMAS F. ODONNELL

DRAWN BY: MEM
DESIGNED BY: MEM
CHECKED BY: TFO
DATE: 01/22/2021
SCALE: AS NOTED
FIELD BOOK:

CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

REVISIONS

NO.	DATE	BY	CHK'D	DESCRIPTION

PROJECT # 12455
TAXIWAY INTERSECTION IMPROVEMENTS
PHASING PLAN 3

SHEET NO. C11 OF 41

TOTAL: 65

CAD FILE: 12444–C11–PHAS3

DRAWING FILE NO. 4–141–47

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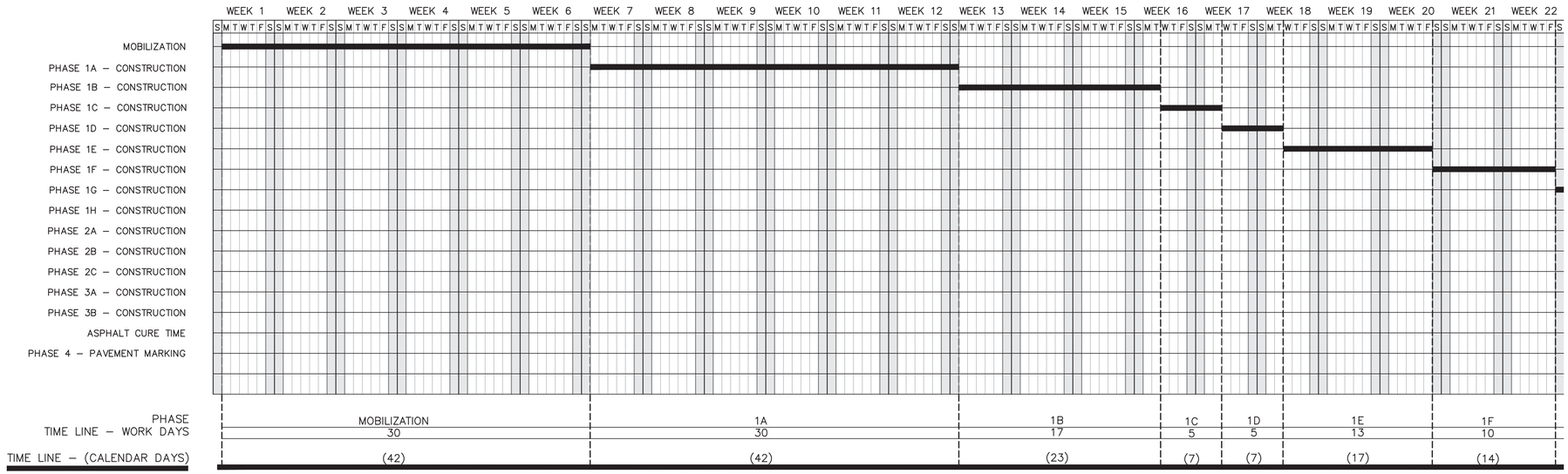
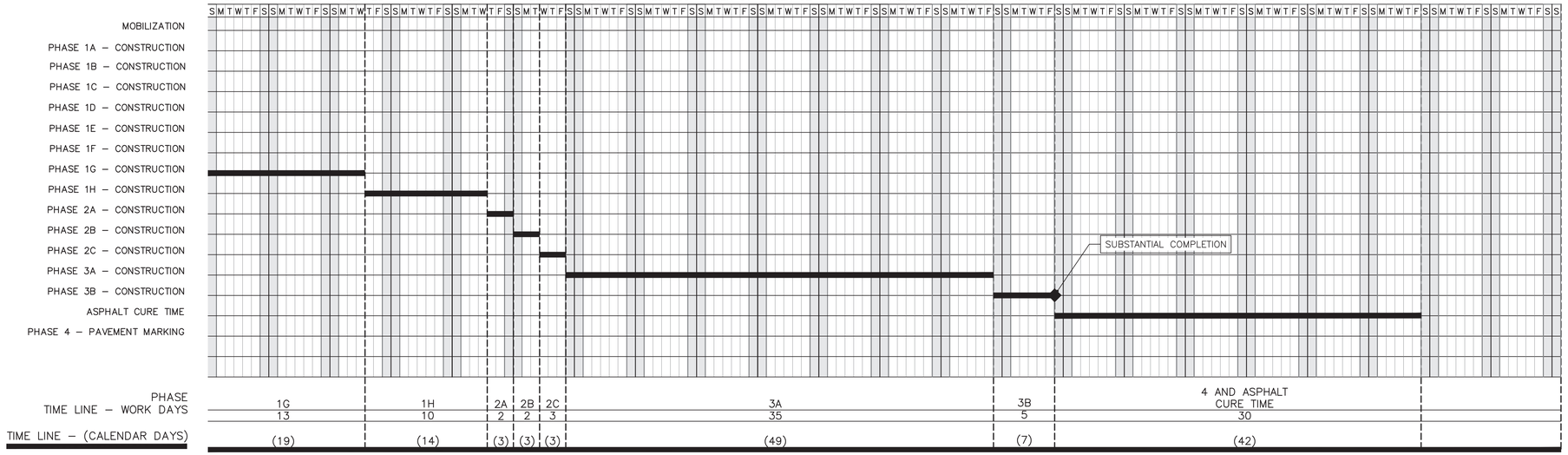
CONSTRUCTION PHASING SCHEDULE



CONSTRUCTION PHASING SCHEDULE



TIMELINE THROUGH SUBSTANTIAL COMPLETION
180 WORKING DAYS
250 CALENDAR DAYS

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1920 WEKIVA WAY, SUITE 200, WEST PALM BEACH, FL 33411
FBPE No. CA 00000696
JOB NO. 044693067

HILLERS ELECTRICAL ENGINEERING, INC.
23257 STATE ROAD 7, SUITE 100
BOCA RATON, FLORIDA 33428
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BID SET

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THOMAS F. O'DONNELL

DRAWN BY:	DESIGNED BY:	CHECKED BY:
MEM	MEM	TFO

DATE: 01/22/2021
SCALE: AS NOTED
FIELD BOOK:

CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

REVISIONS

NO.	DATE	BY	CHK'D	DESCRIPTION

PROJECT # 01/22/2021
TAXIWAY INTERSECTION IMPROVEMENTS
PHASING SCHEDULE

SHEET NO. C12 OF 41
TOTAL: 65
CAD FILE: 12444-C12-SCHD
DRAWING FILE NO. 4-141-47

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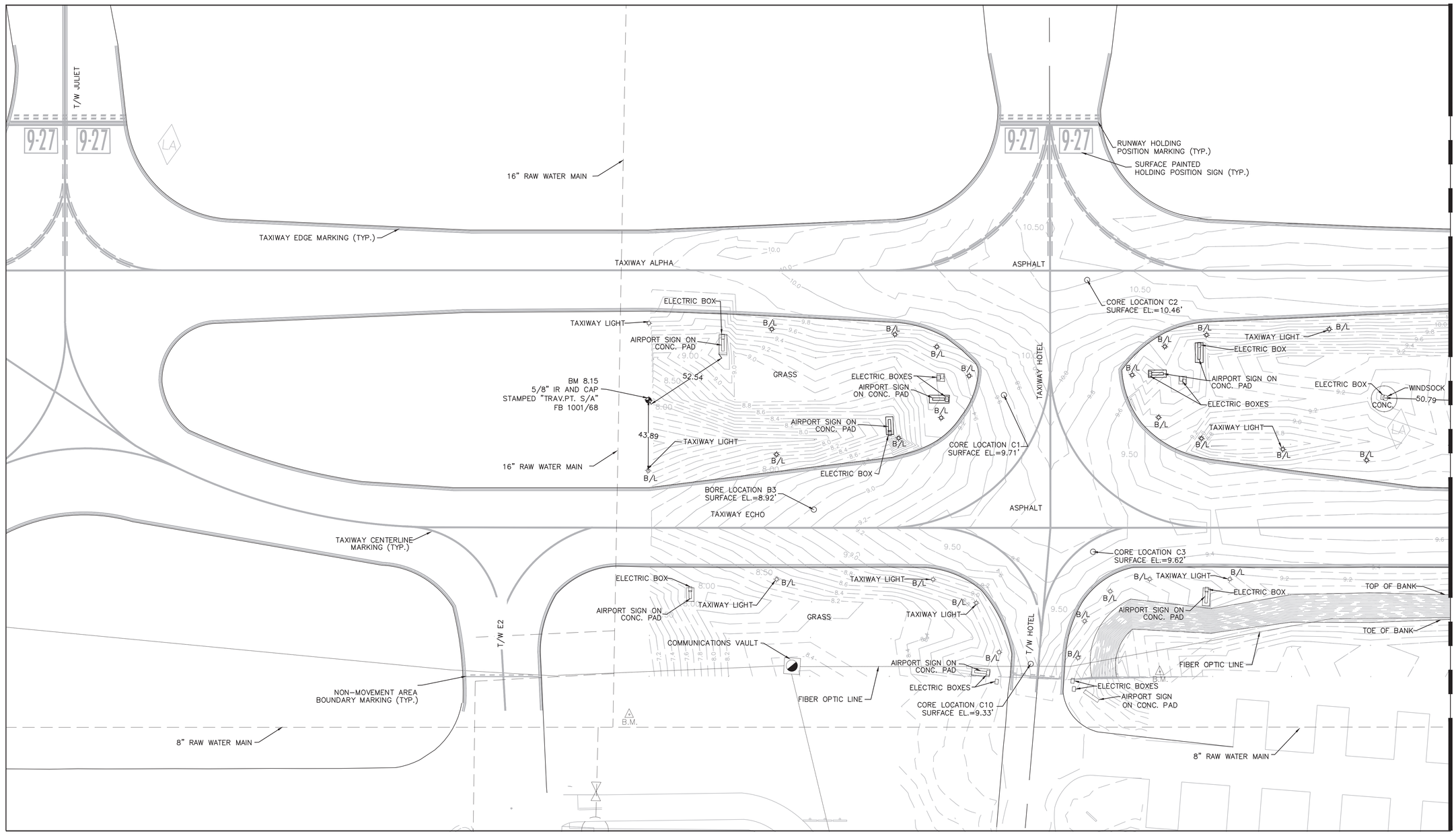

LEGEND

	TAXIWAY OBJECT FREE AREA
11.00'	EXISTING CONTOUR
	AIRPORT SIGN ON CONCRETE PAD
	BENCH MARK
	CORE LOCATION
	TAXIWAY LIGHT
	ELECTRIC BOXES
LA	LIGHTINING ARRESTER
BM	BENCHMARK
+11.6	SPOT ELEVATION
RSA	RUNWAY SAFETY AREA
TSA	TAXIWAY SAFETY AREA
TOFA	TAXIWAY OBJECT FREE AREA

B.C.R.	BROWARD COUNTY RECORDS
CBR	CALIFORNIA BEARING RATIO
CONC.	CONCRETE
EL.	ELEVATION
IR	IRON ROD
LB	LICENSED BUSINESS
N/A	NOT APPLICABLE
NID	NAIL IN DISC
S/A	STONER & ASSOCIATES, INC.
TRAV.PT.	TRAVERSE POINT

NOTES

1. UNDERGROUND UTILITY LOCATIONS ARE APPROXIMATE. CONTRACTOR TO OBTAIN UNDERGROUND UTILITY LOCATION AS REQUIRED BY LAW. SEE GENERAL NOTES SHEET C01. ALL FACILITIES ARE TO REMAIN EXCEPT WHERE OTHERWISE SHOWN. TAKE CARE DURING CONSTRUCTION TO AVOID DAMAGE TO EXISTING ABOVE GROUND AND UNDERGROUND FACILITIES.
2. EXISTING ELECTRICAL CONDITIONS ARE BASED ON AS-BUILTS PROVIDED BY CITY OF FORT LAUDERDALE ON 11/02/18. SURVEY PREPARED BY STONER AND ASSOCIATES ON 12/28/2018
3. THE HORIZONTAL LOCATIONS OF THE FEATURES SHOWN HEREON ARE RELATIVE TO NORTH AMERICAN DATUM OF 1983 WITH THE CORS96 ADJUSTMENT APPLIED (NAD 83 / CORS96) FLORIDA EAST ZONE. ALL DIMENSIONS SHOWN HEREON ARE IN U.S. SURVEY FEET AND DECIMAL FORMAT THEREOF.
4. THE ELEVATIONS SHOWN HEREON ARE BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (N.A.V.D. 88) ESTABLISHED FROM CITY OF FORT LAUDERDALE BENCHMARKS: NW 965 A MAG NAIL IN BRASS DISC STAMPED CITY OF FT LAUD BM NW 965 ON SOUTH SIDE EDGE OF PAVEMENT OF NW 55 COURT, 380' +/- WEST OF CENTER LINE OF NW 23 AVENUE, ELEVATION= 8.436', AND NM 968, A MAG NAIL IN BRASS DISC STAMPED CITY OF FT LAUD BM NW 968 ON NORTHEAST SIDE EDGE OF PAVEMENT OF NW 56 STREET, 306' +/- NORTH of CENTER LINE OF NW 55 COURT, ELEVATION= 7.764'
5. THIS SHEET IS FOR REFERENCE ONLY. CONTRACTOR IS TO REFER TO TOPOGRAPHIC SURVEY PREPARED BY STONER AND ASSOCIATES FOR ELEVATIONS AND UTILITIES WITHIN PROJECT AREA.
6. SOME EXISTING MARKINGS HAVE BEEN INTENTIONALLY OMITTED FOR CLARITY.

0 30' 60'

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600 N. PINE ISLAND RD, SUITE 450, PLANTATION, FL 33324
FBPE No. CA 00000696
JOB NO. 044693067

HILLERS ELECTRICAL ENGINEERING, INC.
23257 STATE ROAD 7, SUITE 100
BOCA RATON, FLORIDA 33428
(561) 451-9165 PHONE
(561) 451-4886 FAX

BID SET

State of Florida
Professional Engineer
License No. 62478
THOMAS F. O'DONNELL

DRAWN BY: MEM	DATE: 01/22/2021		
DESIGNED BY: MEM	SCALE: AS NOTED		
CHECKED BY: TFO	FIELD BOOK:		

CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

REVISIONS			
NO.	DATE	BY	CHK'D	DESCRIPTION

PROJECT # 12455
TAXIWAY INTERSECTION IMPROVEMENTS
EXISTING CONDITIONS (1)

SHEET NO. C13	OF 41
TOTAL:	65
CAD FILE: 12444-MULTI-EXST	
DRAWING FILE NO. 4-141-47	

K:\FTL_AVIATION\044693067 - TW E H & Q IMPROVEMENTS\CADD\PLANSHEETS\12444-MULTI-EXST.DWG

6/16/2021 10:35 AM

MATCH LINE SHEET C13

MATCH LINE SHEET C15

TAXIWAY ALPHA

TAXIWAY QUEBEC

9-27

RUNWAY HOLDING POSITION SIGN (TYP.)
SURFACE PAINTED HOLDING POSITION SIGN (TYP.)

ASPHALT

BM 9.07
5/8" IR AND CAP
STAMPED "TRAV.PT. S/A"
FB 1001/68
49.02

TRACT 1
"F-X-E PLAT"
PLAT BOOK 119 PAGE 4, B.C.R

BORE LOCATION B1
SURFACE EL.=10.33'

TAXIWAY LIGHT

49.71 BM 10.72
5/8" IR AND CAP
STAMPED "TRAV.PT. S/A"
FB 1001/68

142.35

CORE LOCATION C7
SURFACE EL.=10.92'

ELECTRIC BOXES

AIRPORT SIGN ON CONC. PAD

GRASS

CBR LOCATION 1
SURFACE EL.=9.03'

CORE LOCATION C6
SURFACE EL.=10.46'

CORE LOCATION C5
SURFACE EL.=9.63'

CORE LOCATION C9
SURFACE EL.=9.79'

CENTERLINE YELLOW STRIPE W/ BLACK STRIPE EITHER SIDES

TAXIWAY ECHO

CORE LOCATION C4
SURFACE EL.=9.60'

COMMUNICATIONS VAULT

TOP OF BANK

TOE OF BANK

T/W QUEBEC

GRASS

CATCH BASIN N
RIM
ELEV.=6.50'

PIPE INVERT COVERED BY POLLUTANT RETARDANT DEVICE

FIBER OPTIC LINE

SIGN

B.M.

AIRPORT SIGN ON CONC. PAD

ELECTRIC BOX

NON-MOVEMENT AREA BOUNDARY MARKING (TYP.)

8" RAW WATER MAIN

EXISTING FENCE

LEGEND

- TAXIWAY OBJECT FREE AREA
- 11.00' EXISTING CONTOUR
- AIRPORT SIGN ON CONCRETE PAD
- BENCH MARK
- CORE LOCATION
- TAXIWAY LIGHT
- ELECTRIC BOXES
- LA LIGHTINING ARRESTER
- B.M. BENCHMARK
- +11.6 SPOT ELEVATION
- RSA RUNWAY SAFETY AREA
- TSA TAXIWAY SAFETY AREA
- TOFA TAXIWAY OBJECT FREE AREA

B.C.R. BROWARD COUNTY RECORDS
CBR CALIFORNIA BEARING RATIO
CONC. CONCRETE
EL. ELEVATION
IR IRON ROD
LB LICENSED BUSINESS
N/A NOT APPLICABLE
NID NAIL IN DISC
S/A STONER & ASSOCIATES, INC.
TRAV.PT. TRAVERSE POINT

NOTES

1. UNDERGROUND UTILITY LOCATIONS ARE APPROXIMATE. CONTRACTOR TO OBTAIN UNDERGROUND UTILITY LOCATION AS REQUIRED BY LAW. SEE GENERAL NOTES SHEET C01. ALL FACILITIES ARE TO REMAIN EXCEPT WHERE OTHERWISE SHOWN. TAKE CARE DURING CONSTRUCTION TO AVOID DAMAGE TO EXISTING ABOVE GROUND AND UNDERGROUND FACILITIES.
2. EXISTING ELECTRICAL CONDITIONS ARE BASED ON AS-BUILTS PROVIDED BY CITY OF FORT LAUDERDALE ON 11/02/18. SURVEY PREPARED BY STONER AND ASSOCIATES ON 12/28/2018
3. THE HORIZONTAL LOCATIONS OF THE FEATURES SHOWN HEREON ARE RELATIVE TO NORTH AMERICAN DATUM OF 1983 WITH THE CORS96 ADJUSTMENT APPLIED (NAD 83 / CORS96) FLORIDA EAST ZONE. ALL DIMENSIONS SHOWN HEREON ARE IN U.S. SURVEY FEET AND DECIMAL FORMAT THEREOF.
4. THE ELEVATIONS SHOWN HEREON ARE BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (N.A.V.D. 88) ESTABLISHED FROM CITY OF FORT LAUDERDALE BENCHMARKS: NW 965 A MAG NAIL IN BRASS DISC STAMPED CITY OF FT LAUD BM NW 965 ON SOUTH SIDE EDGE OF PAVEMENT OF NW 55 COURT, 380' +/- WEST OF CENTER LINE OF NW 23 AVENUE, ELEVATION= 8.436', AND NM 968, A MAG NAIL IN BRASS DISC STAMPED CITY OF FT LAUD BM NW 968 ON NORTHEAST SIDE EDGE OF PAVEMENT OF NW 56 STREET, 306' +/- NORTH of CENTER LINE OF NW 55 COURT, ELEVATION= 7.764'
5. THIS SHEET IS FOR REFERENCE ONLY. CONTRACTOR IS TO REFER TO TOPOGRAPHIC SURVEY PREPARED BY STONER AND ASSOCIATES FOR ELEVATIONS AND UTILITIES WITHIN PROJECT AREA.
6. SOME EXISTING MARKINGS HAVE BEEN INTENTIONALLY OMITTED FOR CLARITY.

0 30' 60'

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811 Know what's below. Call before you dig.
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PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

REVISIONS

NO.	DATE	BY	CHK'D	DESCRIPTION

PROJECT # 12455
TAXIWAY INTERSECTION IMPROVEMENTS
EXISTING CONDITIONS (2)

SHEET NO.	OF
C14	41

TOTAL: 65

CAD FILE: 12444-MULTI-EXST

DRAWING FILE NO. 4-141-47

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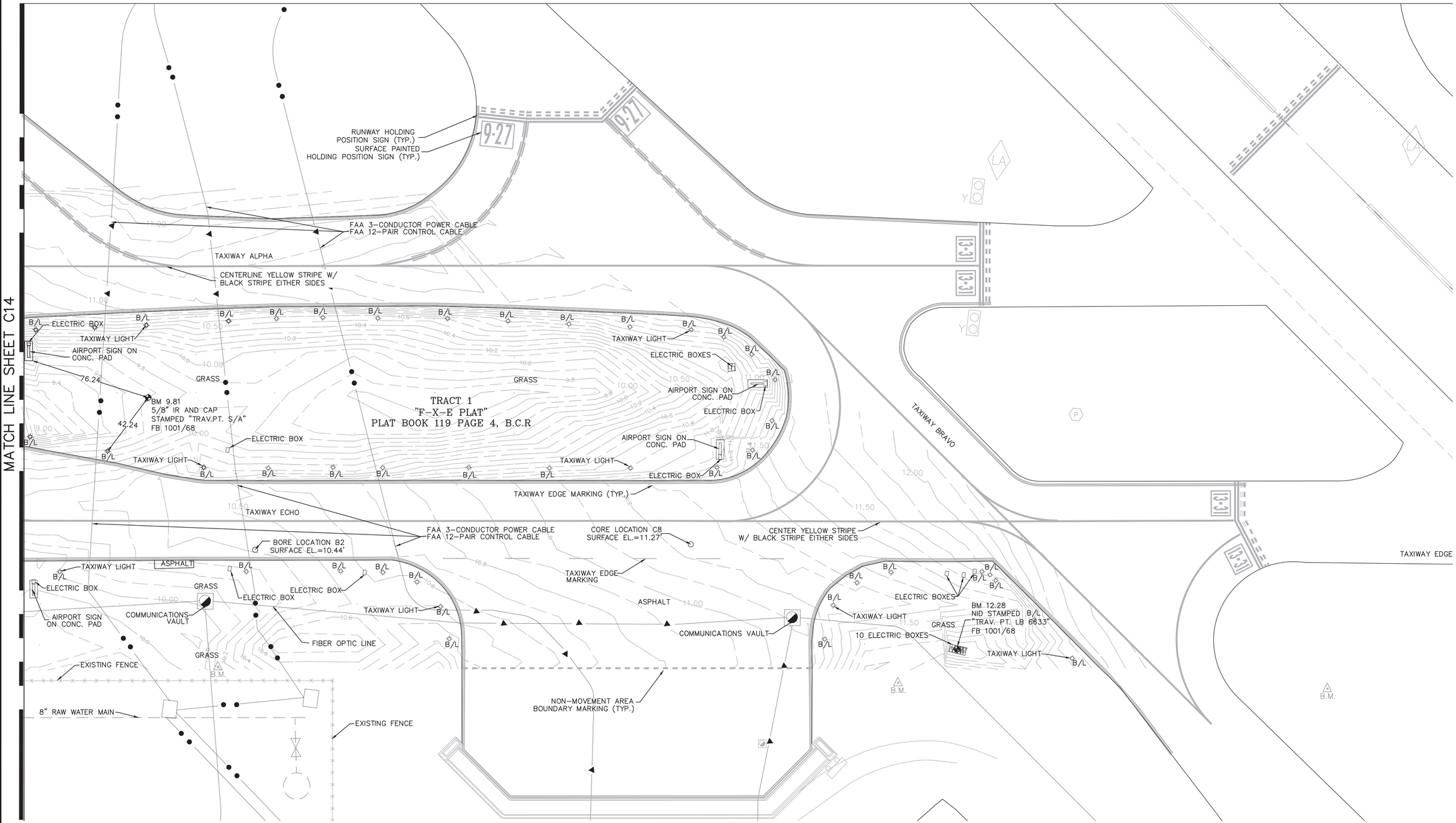

LEGEND

- TAXIWAY OBJECT FREE AREA
- 11.00 EXISTING CONTOUR
- AIRPORT SIGN ON CONCRETE PAD
- BENCH MARK
- CORE LOCATION
- TAXIWAY LIGHT
- ELECTRIC BOXES
- LA LIGHTINING ARRESTER
- B.M. BENCHMARK
- +11.6 SPOT ELEVATION
- RSA RUNWAY SAFETY AREA
- TSA TAXIWAY SAFETY AREA
- TOFA TAXIWAY OBJECT FREE AREA

B.C.R.	BROWARD COUNTY RECORDS
CBR	CALIFORNIA BEARING RATIO
CONC.	CONCRETE
EL.	ELEVATION
IR	IRON ROD
LB	LICENSED BUSINESS
N/A	NOT APPLICABLE
NID	NAIL IN DISC
S/A	STONER & ASSOCIATES, INC.
TRAV.PT.	TRAVERSE POINT

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100 North Andrews Avenue, Fort Lauderdale, Florida 33301

REVISIONS				
NO.	DATE	BY	CHK'D	DESCRIPTION

PROJECT # 12455
TAXIWAY INTERSECTION IMPROVEMENTS
EXISTING CONDITIONS (3)

SHEET NO. C15	OF 41
TOTAL:	65
CAD FILE: 12444-MULTI-EXST	
DRAWING FILE NO. 4-141-47	

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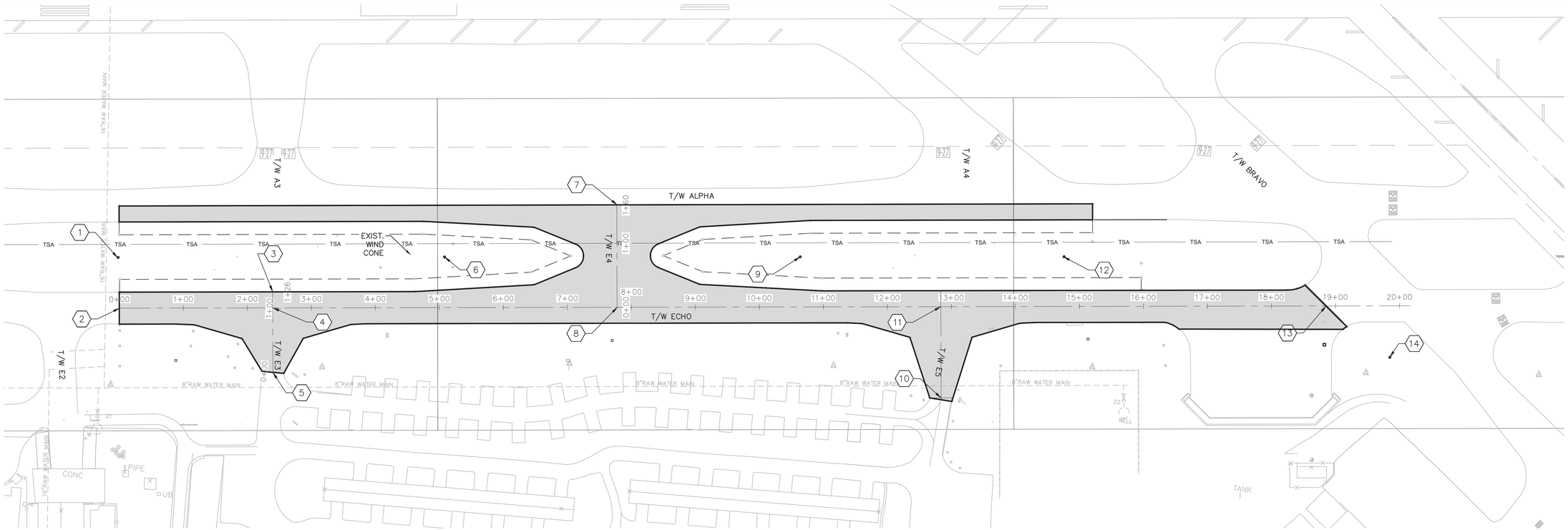


HORIZONTAL AND VERTICAL CONTROL

POINT NO.	NORTHING	EASTING	DESCRIPTION	ELEVATION
1	678003.74	925447.51	BM 5'8" IR AND CAP	8.15
2	677925.21	925458.29	STA: 0+00 ℄ T/W ECHO BEGIN CONSTRUCTION	0.00
3	677977.42	925693.62	STA: 1+26.14 T/W E3 (EXIST. T/W H) END ℄ CONSTRUCTION	0.00
4	677952.58	925696.47	STA: 1+01.14 ℄ T/W E3 (EXIST. T/W H) STA: 2+48.51 ℄ T/W ECHO INTERSECTION	0.00
5	677852.49	925708.00	STA: 0+00 T/W E3 (EXIST. T/W H) BEGIN ℄ CONSTRUCTION	
6	678061.78	925954.15	BM 5/8" IR AND CAP	9.07
7	678172.87	926212.34	STA: 1+60 NEW T/W E4 – END ℄ CONSTRUCTION	0.00
8	678013.98	926230.79	STA: 0+00 BEGIN ℄ T/W E4 STA: 7+78.13 ℄ T/W ECHO INTERSECTION	0.00
9	678124.37	926506.20	BM 5/8" IR AND CAP	10.72
10	677930.03	926749.70	STA: 0+00 T/W E5 (EXIST. T/W Q) BEGIN ℄ CONSTRUCTION	
11	678071.73	926733.36	STA: 1+42.64 END ℄ T/W E5 (EXIST. T/W Q) STA: 1+42.64 END ℄ T/W E5 (EXIST. T/W Q)	0.00
12	678170.97	926915.71	BM 5/8" IR AND CAP	9.81
13	678140.43	927331.16	STA: 18+85.19 ℄ T/W ECHO END CONSTRUCTION	
14	678071.93	927439.18	BM NID STAMPED	12.28

LEGEND

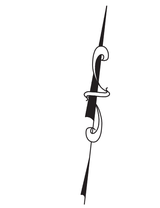
1 — CONTROL POINT NUMBER

PROJECT LIMITS

DATUM: VERTICAL ELEVATIONS ARE REFERENCED TO THE NAVD OF 1988
HORIZONTAL LOCATIONS ARE REFERENCED TO THE NAD OF 1983/CORS96

NOTE:

1. DRAWING BASED ON SURVEY PREPARED BY STONER AND ASSOCIATES, INC. DATE: DECEMBER 28 2018.
2. THE HORIZONTAL COORDINATES SHOWN HEREON ARE BASED ON THE FLORIDA STATE PLANE COORDINATE SYSTEM (EAST ZONE), NORTH AMERICAN DATUM 1983/1990 ADJUSTMENT (N.A.D. 83/90). THE COORDINATES FOR EACH CONTROL POINT WERE ESTABLISHED BY UTILIZING A COMBINATION OF GPS OBSERVATIONS AND/OR CONVENTIONAL SURVEY MEASUREMENTS. THIS SURVEY IS RELATIVE TO SAID SPECIAL PURPOSE SURVEY, CITY PROJECT NO. 1115. THE FOLLOWING MONUMENTS WERE UTILIZED AS THE BASIS OF THE COORDINATES FOR SAID R/W & T/W SURVEY, AND ARE DESCRIBED AS FOLLOWS: 4"X4" CONCRETE MONUMENT WITH DISK STAMPED "JEREMY" FOUND AT THE NORTHWEST END OF RUNWAY 13–31 AND A PK NAIL AND DISK STAMPED "F–1 GPS CITY OF FT. LAUDERDALE" FOUND AT THE SOUTHEAST END OF RUNWAY 13–31. THE COORDINATE VALUES ARE: NORTHING: 675946.570, EASTING: 930729.861 AND NORTHING: 679299.723, EASTING: 926503.817, RESPECTIVELY, AS PROVIDED BY THE CITY OF FORT LAUDERDALE AND NOTED IN SAID SURVEY.
3. THE ELEVATIONS SHOWN HEREON ARE BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (N.A.V.D. 88) ESTABLISHED FROM CITY OF FORT LAUDERDALE BENCHMARKS: NW 965 A MAG NAIL IN BRASS DISC STAMPED CITY OF FT LAUD BM NW 965 ON SOUTH SIDE EDGE OF PAVEMENT OF NW 55 COURT, 380' ± WEST OF THE CENTER LINE OF NW 23 AVENUE, ELEVATION=8.436' AND NM 968, A MAG NAIL IN BRASS DISC STAMPED CITY OF FT LAUD BM NW 968 ON NORTHEAST SIDE EDGE OF PAVEMENT OF NW 56 STREET, 306' ± NORTH OF CENTER LINE OF NW 55 COURT, ELEVATION=7.764'. THE EXPECTED VERTICAL ACCURACY OF THE ELEVATIONS SHOWN HEREON IS ±0.03' FOR HARD SURFACES AND ±0.1' FOR SOFT SURFACES.
4. PRIOR TO ANY DEMOLITION OR CONSTRUCTION, THE CONTRACTOR SHALL VERIFY THE ACCURACY OF ALL CONTROL POINTS. ANY DISCREPANCIES WILL BE IMMEDIATELY REPORTED TO THE ENGINEER.



0 80' 160''

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REVISIONS

NO.	DATE	BY	CHK'D	DESCRIPTION

PROJECT # 12455
TAXIWAY INTERSECTION IMPROVEMENTS
PROJECT LAYOUT-SURVEY CONTROL PLAN

SHEET NO.	OF
C16	41

TOTAL: 65

CAD FILE: 12444–C16–CTRL

DRAWING FILE NO. 4–141–47

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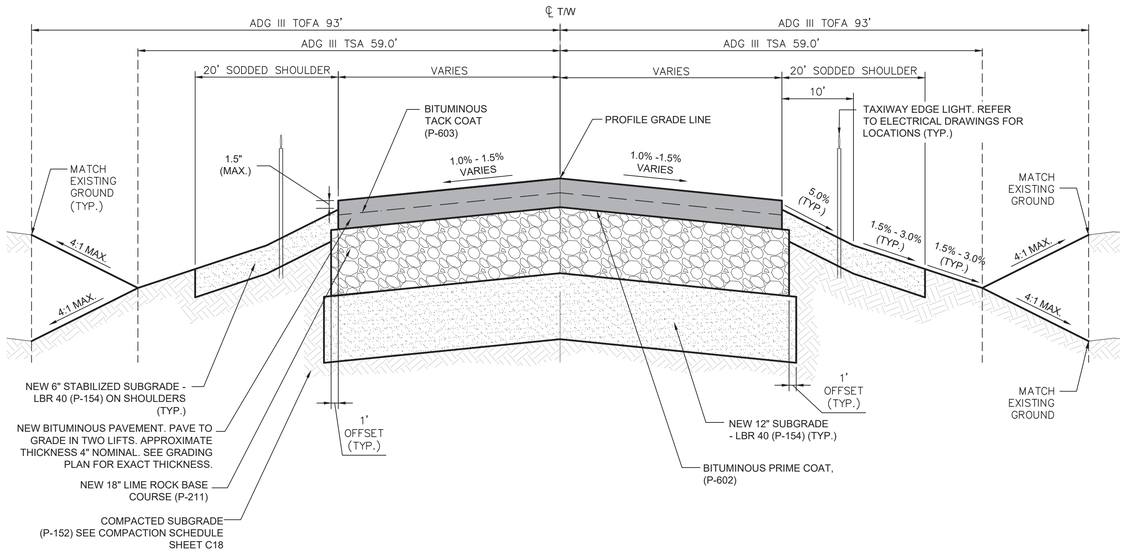
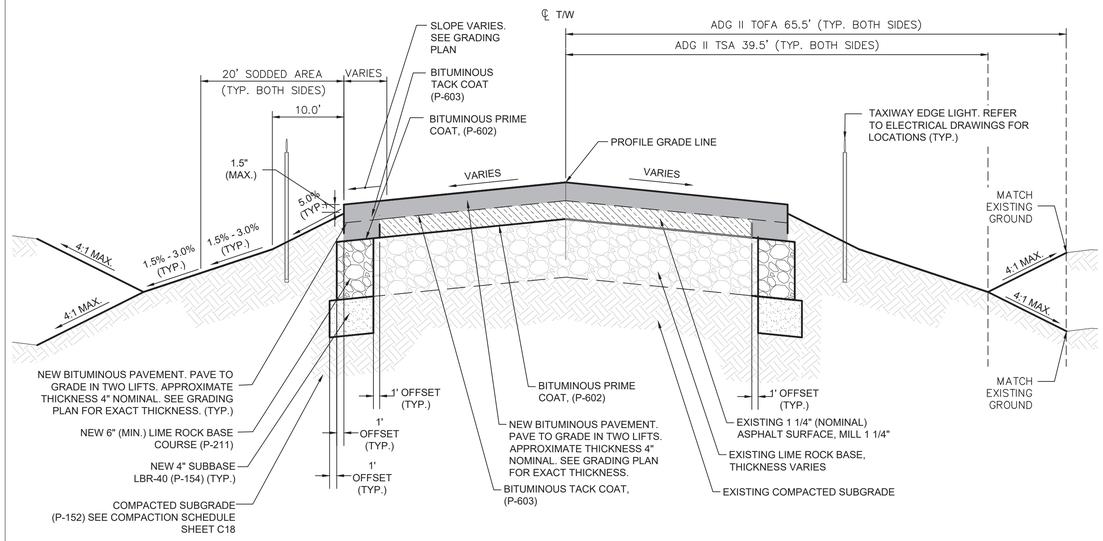


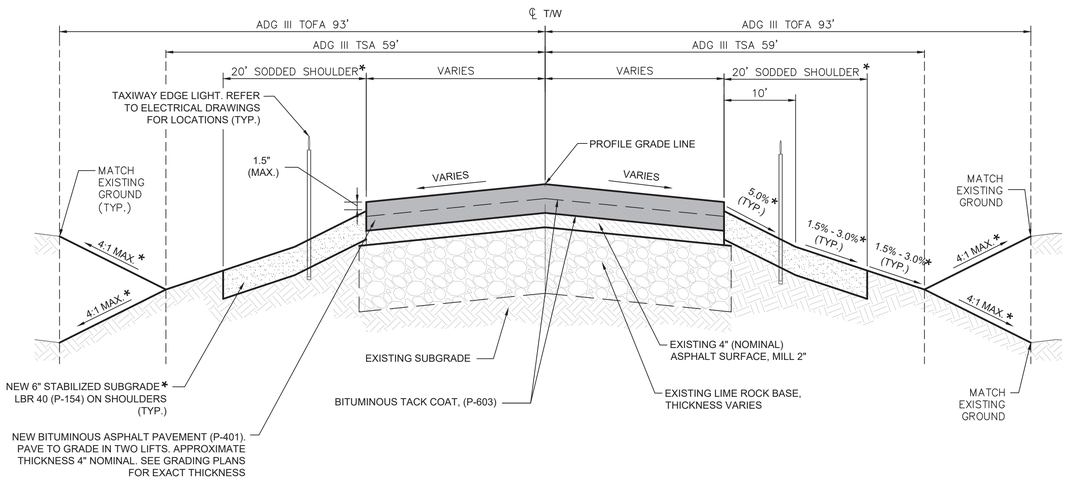
TYPICAL SECTION NO. 1 – NEW TAXIWAY E4 CONSTRUCTION

N.T.S.



TYPICAL SECTION NO. 3 – NEW PAVEMENT ADJACENT TO MILL AND OVERLAY AT EXISTING TAXIWAYS HOTEL AND QUEBEC

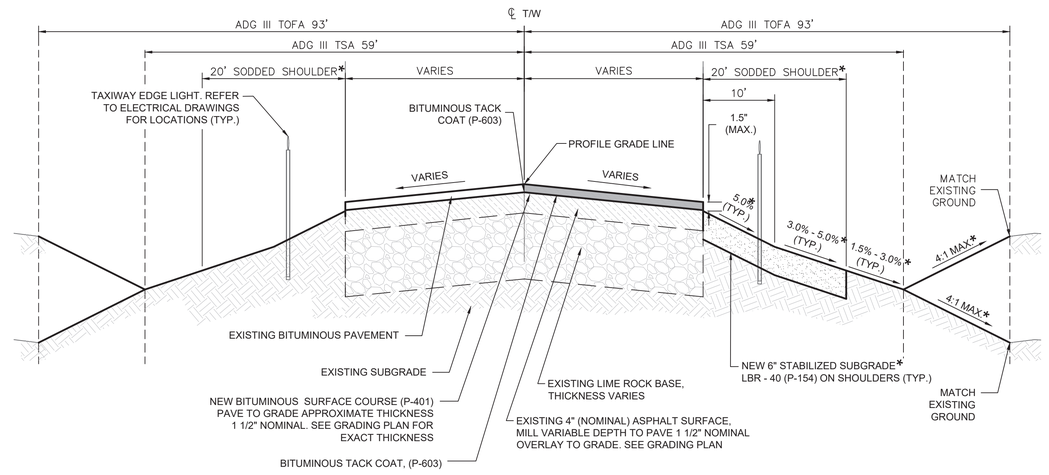
N.T.S.



* SEE SHEETS C25–C27 FOR SHOULDER & GRADING LOCATIONS

TYPICAL SECTION NO. 2 – T/W MILL AND OVERLAY AT EXISTING TAXIWAY ECHO

N.T.S.



* SEE SHEETS C25–C27 FOR SHOULDER & GRADING LOCATIONS

TYPICAL SECTION NO. 4 – T/W MILL AND OVERLAY AT EXISTING TAXIWAY ALPHA

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BID SET

ENGINEER: THOMAS F. O'DONNELL
REG. No: 62478
DATE:
TEL: 561-840-0825
FAX:

DRAWN BY: MEM | DESIGNED BY: MEM | CHECKED BY: TFO
DATE: 01/22/2021 | SCALE: AS NOTED
FIELD BOOK:

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REVISIONS

NO.	DATE	BY	CHK'D	DESCRIPTION

PROJECT # 12455
TAXIWAY INTERSECTION IMPROVEMENTS
TYPICAL SECTIONS (1)

SHEET NO. C17 | 41
TOTAL: 65
CAD FILE: 12444–MULTI–TSEC
DRAWING FILE NO. 4–141–47

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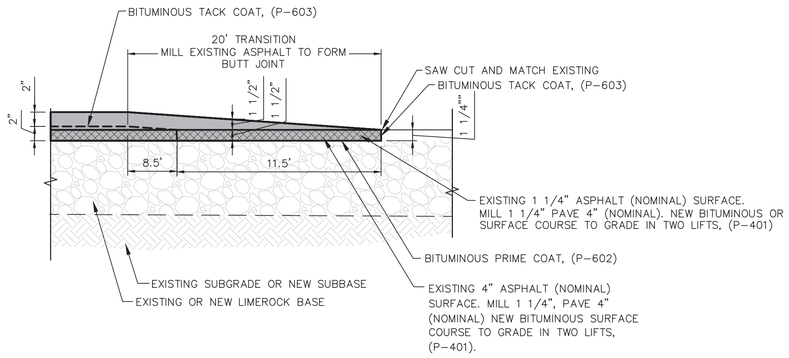
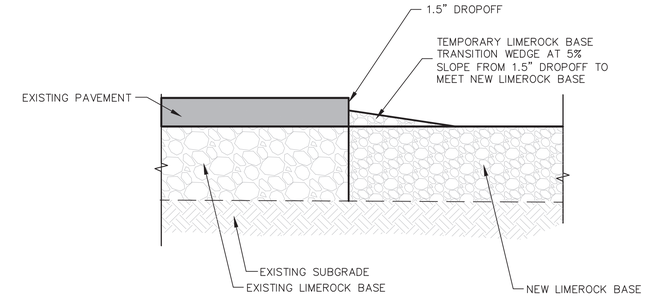


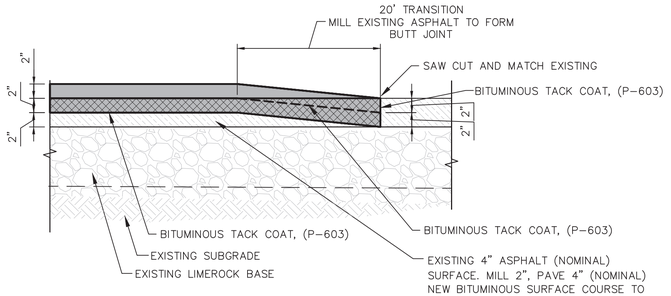
DETAIL 3 – BUTT JOINT OVERLAY TRANSITION TO EXISTING (4" TO 1 1/2")

N.T.S.



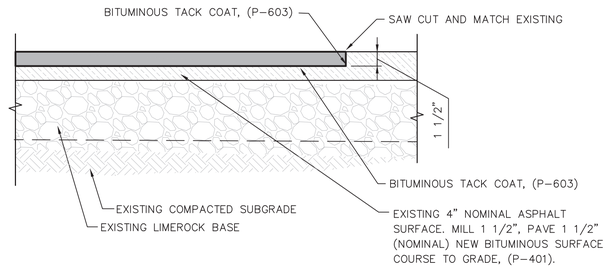
DETAIL 4 – TEMPORARY LIMEROCK BASE TRANSITION WEDGE

N.T.S.



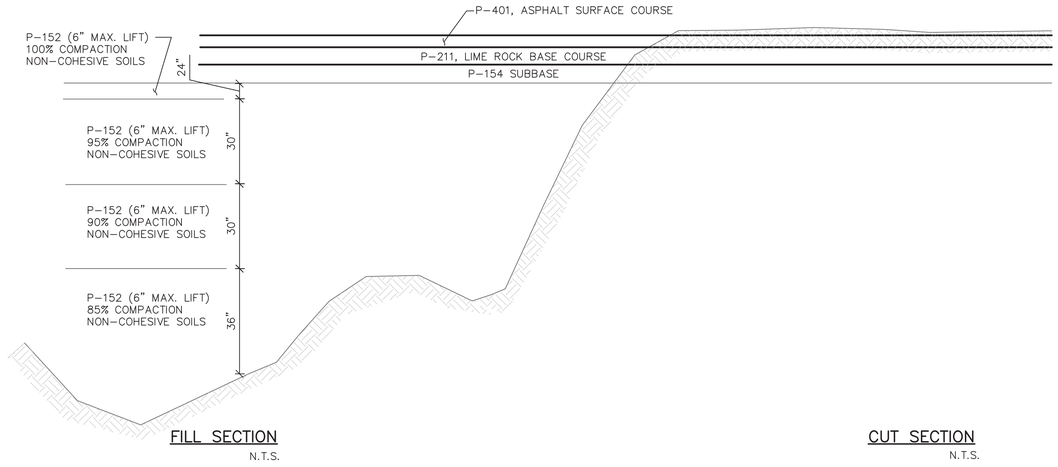
DETAIL 2 – BUTT JOINT OVERLAY TRANSITION TO EXISTING (MILL 2", PAVE 4")

N.T.S.



DETAIL 1 – BUTT JOINT OVERLAY TRANSITION TO EXISTING (MILL 1 1/2", PAVE 1 1/2")

N.T.S.



FILL SECTION

N.T.S.

CUT SECTION

N.T.S.

COMPACTION SCHEDULE NOTES:

THE SUBGRADE IN CUT AREAS SHALL HAVE NATURAL DENSITIES SHOWN, SHALL BE COMPACTED FROM THE SURFACE TO ACHIEVE THE REQUIRED DENSITIES, OR SHALL BE REMOVED AND REPLACED IN WHICH CASE THE MINIMUM DENSITIES FOR FILLS APPLY. SEE SPECIFICATION P-152 FOR OVER EXCAVATION REQUIREMENTS.

NON-COHESIVE SOILS, FOR THE PURPOSE OF DETERMINING COMPACTION, ARE THOSE WITH A P.I. < 3.

UNDER AREAS THAT WILL NOT BE PAVED, ROLLING OPERATIONS SHALL BE CONTINUED UNTIL THE EMBANKMENT IS COMPACTED TO NOT LESS THAT 95% OF MAXIMUM DENSITY FOR NON COHESIVE SOILS AND 90% OF MAXIMUM DENSITY FOR COHESIVE SOILS PER ITEM P-152.

COMPACTION SCHEDULE

N.T.S.

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1920 WEKIVA WAY, SUITE 200, WEST PALM BEACH, FL 33411
FBPE No. CA 00000696
JOB NO. 044693067

HILLERS ELECTRICAL ENGINEERING, INC.
23257 STATE ROAD 7, SUITE 100
BOCA RATON, FLORIDA 33428
(561) 451-9165 PHONE
(561) 451-4886 FAX

BID SET

ENGINEER: THOMAS F. O'DONNELL
REG. No: 62478
DATE:
TEL: 561-840-0825
FAX:

DRAWN BY: MEM | DATE: 01/22/2021
DESIGNED BY: MEM | SCALE: AS NOTED
CHECKED BY: TFO | FIELD BOOK:

CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

REVISIONS

NO.	DATE	BY	CHK'D	DESCRIPTION

PROJECT # 12455
TAXIWAY INTERSECTION IMPROVEMENTS
TYPICAL SECTIONS (2)

SHEET NO. C18 | 41
TOTAL: 65
CAD FILE: 12444-MULTI-TSEC
DRAWING FILE NO. 4-141-47

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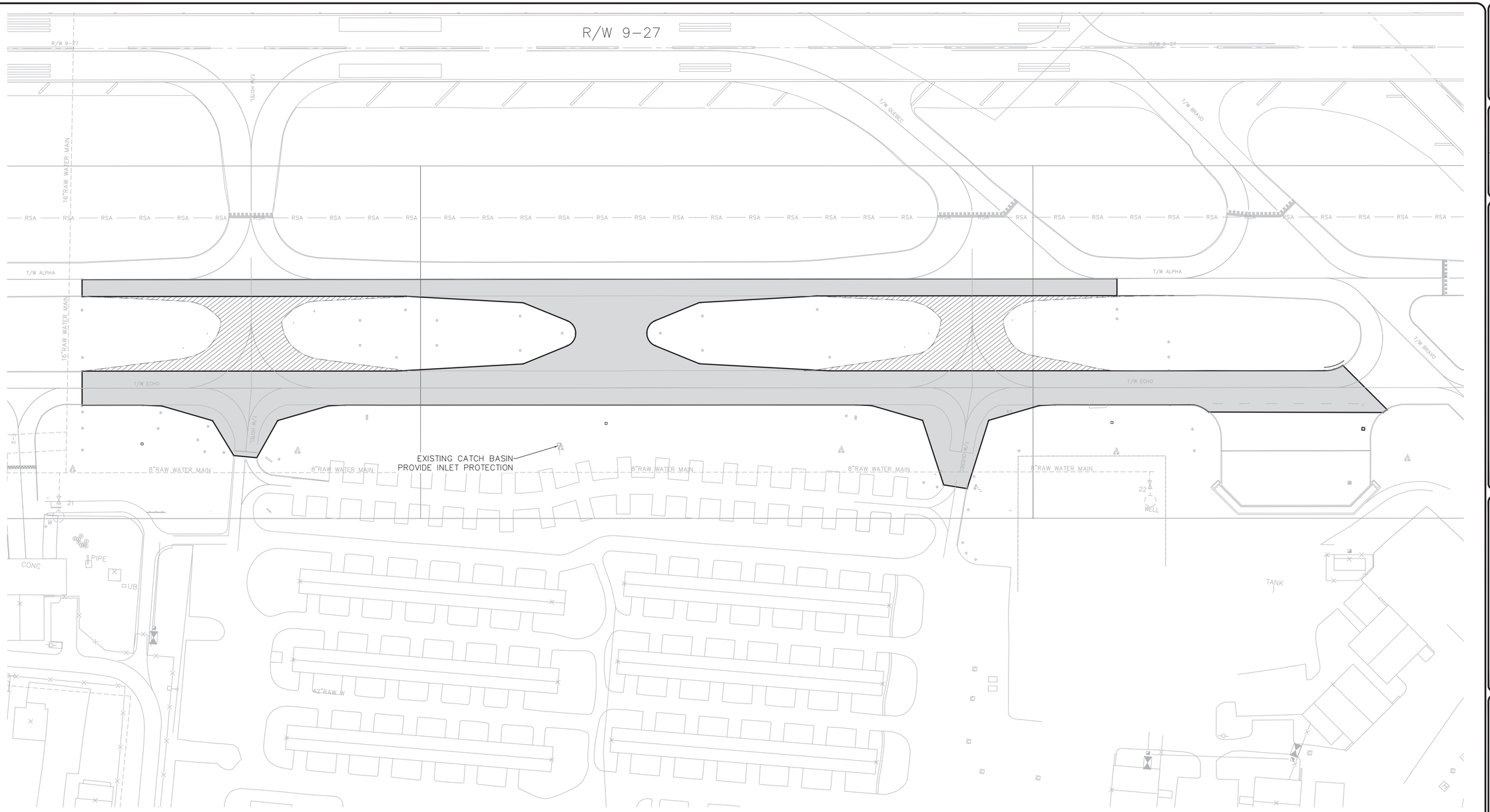

LEGEND (LINE TYPE)

——— RSA ———	RUNWAY SAFETY AREA
	APPROXIMATE LIMITS OF PAVEMENT REMOVAL
	APPROXIMATE LIMITS OF PAVEMENT REHABILITATION AND NEW PAVEMENT

NOTES

1. SEE SHEET C20 FOR EROSION CONTROL DETAILS
2. REFER TO SHEETS C06 TO C10 FOR PHASING PLANS
3. ALL INLETS WITHIN THE LIMIT OF WORK WILL RECEIVE INLET PROTECTION.
4. ALL EROSION AND SEDIMENTATION CONTROL DEVICES SHALL BE IN PLACE PRIOR TO THE START OF ANY CONSTRUCTION ACTIVITIES.
5. CONTRACTOR SHALL INSTALL AND MAINTAIN NECESSARY SYSTEMS THROUGHOUT THE DURATION OF THE CONTRACT AND PROVIDE ADDITIONAL BEST MANAGEMENT PRACTICES (BMP'S) AS REQUIRED TO MEET REGULATORY CRITERIA AT NO ADDITIONAL COST TO OWNER.
6. CONTRACTOR SHALL INSTALL STABILIZED CONSTRUCTION ENTRANCE PRIOR TO BEGINNING ANY WORK.
7. CONTRACTOR WILL SUBMIT A PLAN FOR DUST CONTROL PRIOR TO ANY LAND DISTURBING ACTIVITIES PER ITEM C-102. THE PLAN MUST INCLUDE BUT NOT BE LIMITED TO, PROVIDING WATER TRUCK ON A 24/7 BASIS CAPABLE OF BEING ON SITE WITHIN 30 MINUTES TO WATER DISTURBED AND UNPROTECTED SURFACES.
8. SWEEPER TRUCK SHALL FOLLOW ALL WORKING VEHICLES TO PREVENT FOREIGN OBJECT DEBRIS (FOD) ON OPEN TAXIWAYS.

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811 Know what's **below.** **Call** before you dig.

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JOEY

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REVISIONS

NO.	DATE	BY	CHK'D	DESCRIPTION

PROJECT # 12455
TAXIWAY INTERSECTION IMPROVEMENTS
EROSION CONTROL PLAN

SHEET NO. C19 OF 41

TOTAL: 65

CAD FILE: 12444-C19-EROS

DRAWING FILE NO. 4-141-47

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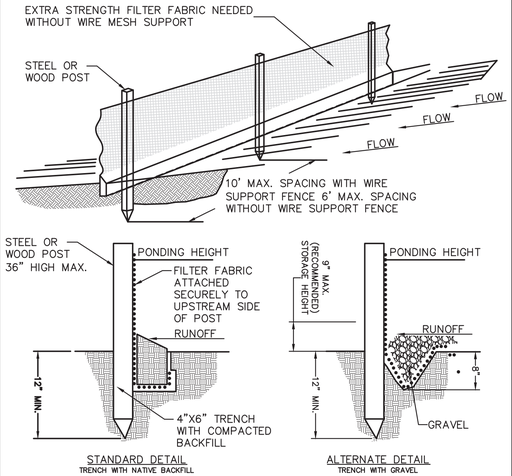


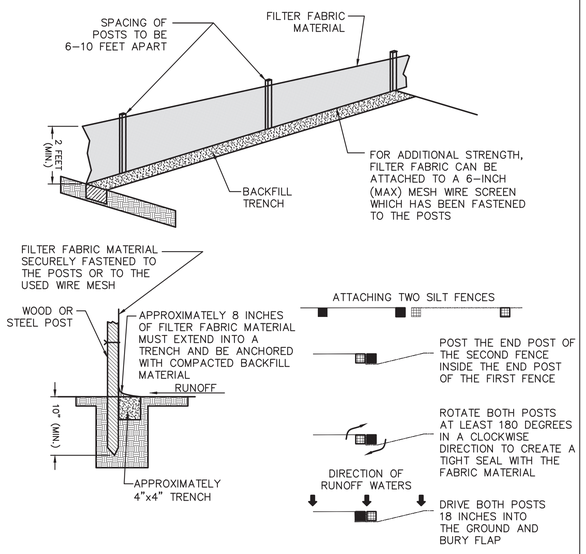
STANDARD DETAIL
TRENCH WITH NATIVE BACKFILL

ALTERNATE DETAIL
TRENCH WITH GRAVEL

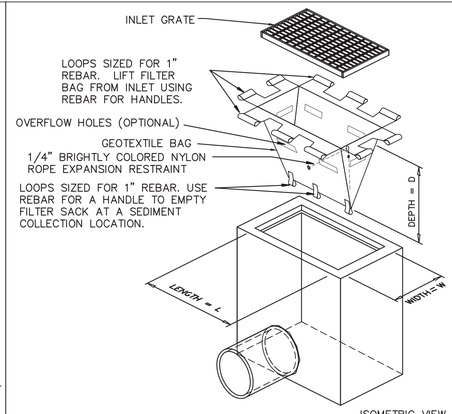
NOTES:

1. INSPECT AND REPAIR FENCE AFTER EACH STORM EVENT AND REMOVE SEDIMENT WHEN NECESSARY.
2. REMOVED SEDIMENT SHALL BE DEPOSITED TO AN AREA THAT WILL NOT CONTRIBUTE SEDIMENT OFF-SITE AND CAN BE PERMANENTLY STABILIZED.
3. SILT FENCE SHALL BE PLACED ON SLOPE CONTOURS TO MAXIMIZE PONDING EFFICIENCY.

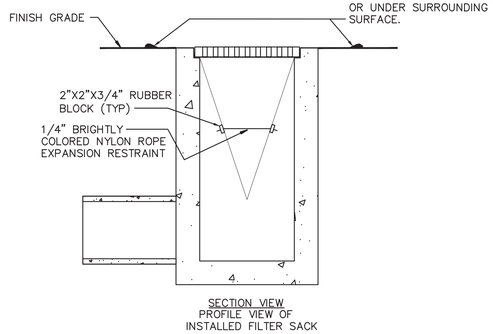
SILT FENCE DETAIL
N.T.S.



SILT FENCE INSTALLATION DETAIL
N.T.S.



ISOMETRIC VIEW



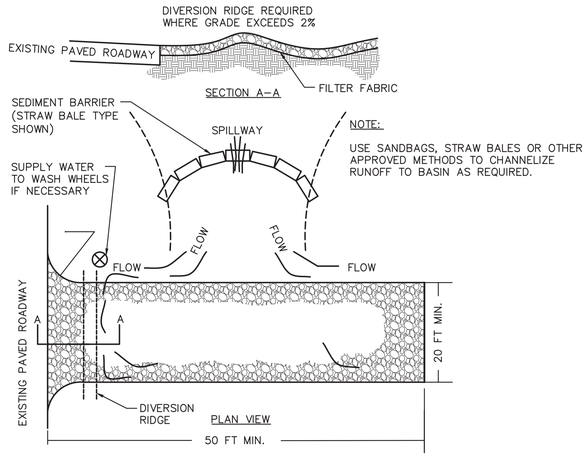
SECTION VIEW
PROFILE VIEW OF INSTALLED FILTER SACK

NOTES:

1. REMOVE TRAPPED SEDIMENT WHEN BRIGHTLY COLORED EXPANSION RESTRAINT CAN NO LONGER BE SEEN.
2. GEOTEXTILE SHALL BE A WOVEN POLYPROPYLENE FABRIC THAT MEETS OR EXCEEDS REQUIREMENTS IN THE SPECIFICATIONS TABLE.
3. PLACE AN OIL ADSORBENT PAD OR PILLOW OVER INLET GRATE WHEN OIL SPILLS ARE A CONCERN.
4. INSPECT PER REGULATORY REQUIREMENTS.
5. THE WIDTH, "W", OF THE FILTER SACK SHALL MATCH THE INSIDE WIDTH OF THE GRATED INLET BOX.
6. THE DEPTH, "D", OF THE FILTER SACK SHALL BE BETWEEN 18 INCHES AND 36 INCHES.
7. THE LENGTH, "L", OF THE FILTER SACK SHALL MATCH THE INSIDE LENGTH OF THE GRATED INLET BOX.

LOW TO MODERATE FLOW GEOTEXTILE FABRIC SPECIFICATION TABLE		
PROPERTIES	TEST METHOD	UNITS
GRAB TENSILE STRENGTH	ASTM D-4632	300 LBS
GRAB TENSILE ELONGATION	ASTM D-4632	20 %
PUNCTURE	ASTM D-4833	120 LBS
MULLEN BURST	ASTM D-3786	800 PSI
TRAPEZOID TEAR	ASTM D-4533	120 LBS
UV RESISTANCE	ASTM D-4355	80 %
APPARENT OPENING SIZE	ASTM D-4751	40 US SIEVE
FLOW RATE	ASTM D-4491	40 GAL/MIN/SQ FT
PERMITTIVITY	ASTM D-4491	0.55 SEC -1
MODERATE TO HIGH FLOW GEOTEXTILE FABRIC SPECIFICATION TABLE		
PROPERTIES	TEST METHOD	UNITS
GRAB TENSILE STRENGTH	ASTM D-4632	265 LBS
GRAB TENSILE ELONGATION	ASTM D-4632	20 %
PUNCTURE	ASTM D-4833	135 LBS
MULLEN BURST	ASTM D-3786	420 PSI
TRAPEZOID TEAR	ASTM D-4533	45 LBS
UV RESISTANCE	ASTM D-4355	90 %
APPARENT OPENING SIZE	ASTM D-4751	20 US SIEVE
FLOW RATE	ASTM D-4491	200 GAL/MIN/SQ FT
PERMITTIVITY	ASTM D-4491	1.5 SEC -1

FILTER SACK DETAIL
N.T.S.



NOTES:

1. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. THIS MAY REQUIRE TOP DRESSING, REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT.
2. WHEN NECESSARY, WHEELS SHALL BE CLEANED PRIOR TO ENTRANCE ONTO PUBLIC RIGHT-OF-WAY.
3. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE THAT DRAINS INTO AN APPROVED SEDIMENT TRAP OR SEDIMENT BASIN.

STABILIZED CONSTRUCTION ENTRANCE
N.T.S.

BEST MANAGEMENT PRACTICE SEQUENCE:

1. INSTALL INLET PROTECTION DEVICES ON EXISTING STRUCTURES.
2. BEGIN CLEARING AND GRUBBING THE SITE.
3. BEGIN DEMOLITION AND GRADING THE SITE.
4. START CONSTRUCTION OF THE FACILITIES.
5. TEMPORARILY SEED, THROUGHOUT CONSTRUCTION, DENUDED AREAS THAT WILL BE INACTIVE FOR 7 DAYS OR MORE.
6. PERMANENTLY STABILIZE AREAS TO BE VEGETATED AS THEY ARE BROUGHT TO FINAL GRADE.
7. AT CONSTRUCTION COMPLETION CONTRACTOR IS TO ENSURE THAT ALL SEDIMENT BUILD UP IS REMOVED FROM ALL DRAINAGE SWALES, SEWERS, AND STRUCTURES.

GENERAL NOTES:

1. LOCATE SILT FENCE AS SHOWN OR AT THE LIMITS OF GRADING SUBJECT TO THE APPROVAL OF THE ENGINEER.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CORRECTION OF ANY EROSION OR WATER QUALITY PROBLEMS THAT RESULT FROM THE CONSTRUCTION ACTIVITIES.
3. THE CONTRACTOR MAY BE DIRECTED TO REMOVE PORTIONS OF SILT FENCE AT DIFFERENT TIMES DURING THE PROJECT FOR SAFE AIRCRAFT OPERATIONS AND REPLACE THE FENCE SUBSEQUENTLY. ALL COST FOR REMOVAL AND REPLACEMENT SHALL BE CONSIDERED INCIDENTAL TO THE CONTRACT.
4. THE CONTRACTOR SHALL PROVIDE A WATER TRUCK WHICH SHALL BE ON SITE AT ALL TIMES. THE TRUCK SHALL BE USED TO PROVIDE DUST CONTROL IN THE WORK AREA AS WELL AS CONTRACTOR STAGING AREAS AND HAUL ROUTES.

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FIELD BOOK:	

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PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

PROJECT # 12455
TAXIWAY INTERSECTION IMPROVEMENTS
EROSION CONTROL DETAILS

SHEET NO. C20 OF 41
TOTAL: 65
CAD FILE: 12444-C20-DETL
DRAWING FILE NO. 4-141-47

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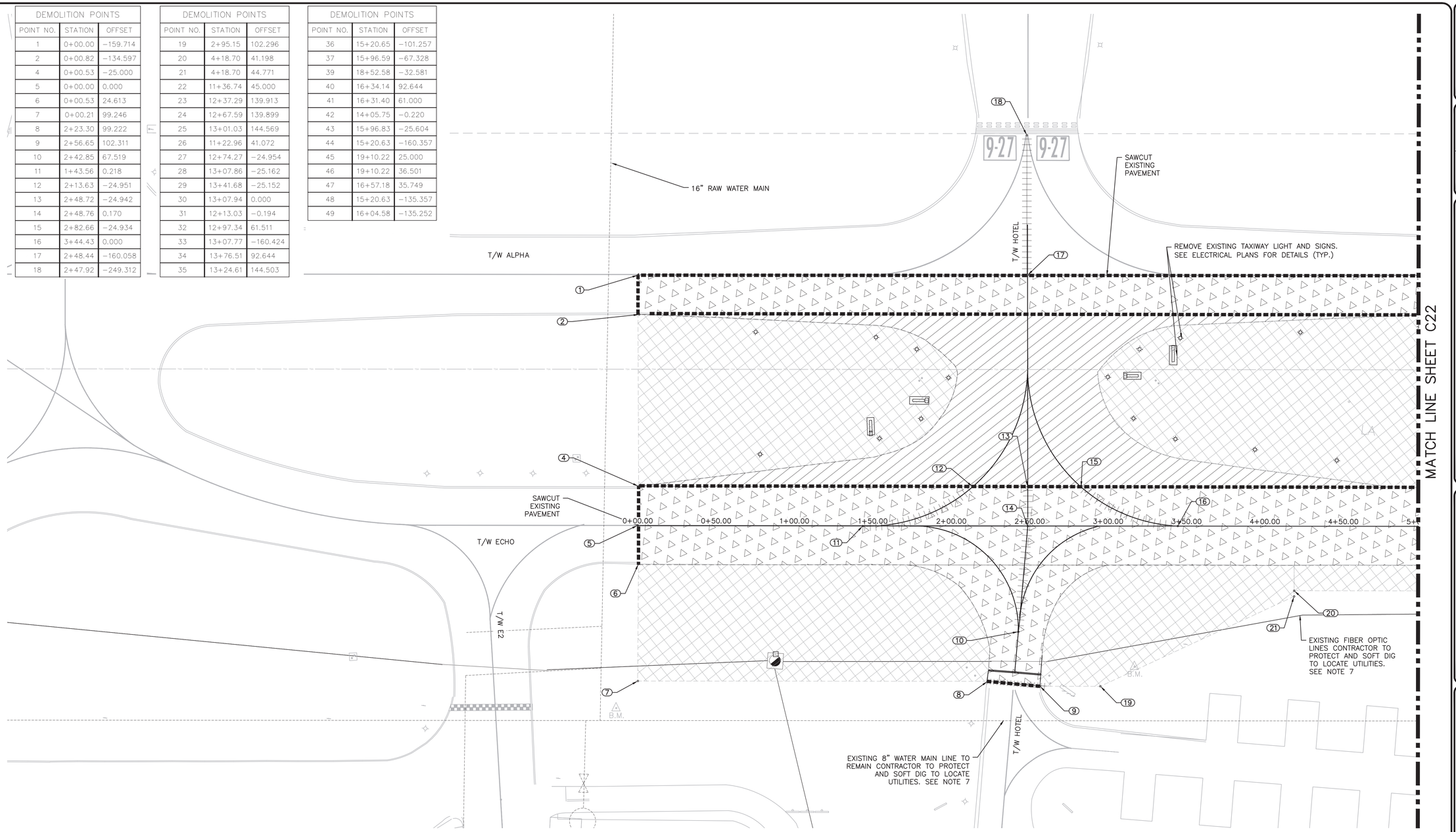
DEMOLITION POINTS		
POINT NO.	STATION	OFFSET
1	0+00.00	−159.714
2	0+00.82	−134.597
4	0+00.53	−25.000
5	0+00.00	0.000
6	0+00.53	24.613
7	0+00.21	99.246
8	2+23.30	99.222
9	2+56.65	102.311
10	2+42.85	67.519
11	1+43.56	0.218
12	2+13.63	−24.951
13	2+48.72	−24.942
14	2+48.76	0.170
15	2+82.66	−24.934
16	3+44.43	0.000
17	2+48.44	−160.058
18	2+47.92	−249.312

DEMOLITION POINTS		
POINT NO.	STATION	OFFSET
19	2+95.15	102.296
20	4+18.70	41.198
21	4+18.70	44.771
22	11+36.74	45.000
23	12+37.29	139.913
24	12+67.59	139.899
25	13+01.03	144.569
26	11+22.96	41.072
27	12+74.27	−24.954
28	13+07.86	−25.162
29	13+41.68	−25.152
30	13+07.94	0.000
31	12+13.03	−0.194
32	12+97.34	61.511
33	13+07.77	−160.424
34	13+76.51	92.644
35	13+24.61	144.503

DEMOLITION POINTS		
POINT NO.	STATION	OFFSET
36	15+20.65	−101.257
37	15+96.59	−67.328
39	18+52.58	−32.581
40	16+34.14	92.644
41	16+31.40	61.000
42	14+05.75	−0.220
43	15+96.83	−25.604
44	15+20.63	−160.357
45	19+10.22	25.000
46	19+10.22	36.501
47	16+57.18	35.749
48	15+20.63	−135.357
49	16+04.58	−135.252



LEGEND (SYMBOL)

- AIRPORT SIGN ON CONCRETE PAD
- BENCH MARK
- TAXIWAY LIGHT
- ELECTRIC BOXES
- LIGHTINING ARRESTER
- BENCHMARK
- SPOT ELEVATION
- RUNWAY SAFETY AREA
- TAXIWAY SAFETY AREA
- TAXIWAY OBJECT FREE AREA

LEGEND (WORK)

- ASPHALT PAVEMENT REMOVAL. REFER TO PAVEMENT GEOMETRY PLANS SHEETS C25 –C27
- CLEARING AND GRUBBING.
- MILLING AND OVERLAYING
- SAW CUT EXISTING PAVEMENT
- REMOVE EXISTING PAVEMENT MARKING
- REMOVE EXISTING SURFACE PAINTED SIGN

DEMOLITION NOTES

1. EXPOSED SUBGRADE AND BASE MATERIAL TO BE KEPT MOIST AND COMPACTED TO MINIMIZE FOD FROM JET BLAST AND SHALL BE TREATED WITH A DUST STABILIZER WHEN REQUESTED BY THE ENGINEER. ALL DUST CONTROL RELATED COSTS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AND CONSIDERED INCIDENTAL TO ITEM P–156.
2. CONTRACTOR WILL PROTECT ALL EXISTING CONCRETE OR ASPHALT PAVEMENT TO REMAIN IN PLACE DURING MILLING AND FULL DEPTH PAVEMENT REMOVAL. ALL CONCRETE OR ASPHALT PAVEMENT DAMAGED DURING MILLING AND REMOVAL SHALL BE REPAIRED OR REPLACED AT THE CONTRACTOR'S EXPENSE BY A METHOD SATISFACTORY TO THE ENGINEE
3. CONTRACTOR SHALL USE A METHOD OF MARKING REMOVAL THAT DOES NOT DAMAGE THE EXISTING PAVEMENT AND JOINT SEALS. ANY DAMAGE CAUSED TO THE EXISTING PAVEMENT AND JOINT SEALS SHALL BE REPAIRED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER.
4. CONTRACTOR SHALL PROTECT ALL MARKINGS TO REMAIN. ANY MARKINGS THAT ARE DAMAGED OR INADVERTENTLY REMOVED SHALL BE REPAINTED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER.
5. CONTRACTOR SHALL PROTECT ALL IN–PAVEMENT CENTERLINE LIGHTS, AND EDGE LIGHTS, FAA FACILITIES, NAVAIDS AND CABLES AT ALL TIMES DURING CONSTRUCTION. HAND DIG AROUND FAA CABLES.
6. REFER TO SHEETS E04–E06 FOR ELECTRICAL DEMOLITION
7. EXISTING RAW WATER MAIN AND FIBER OPTIC LINE TO BE PROTECTED THROUGH DURATION OF WORK.

UTILITIES NOTE:

1. UNDERGROUND UTILITY LOCATIONS ARE APPROXIMATE. CONTRACTOR TO OBTAIN UNDERGROUND UTILITY LOCATION AS REQUIRED BY LAW. SEE GENERAL NOTES SHEET C01. ALL FACILITIES ARE TO REMAIN EXCEPT WHERE OTHERWISE SHOWN. TAKE CARE DURING CONSTRUCTION TO AVOID DAMAGE TO EXISTING ABOVE GROUND AND UNDERGROUND FACILITIES.

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PROJECT # 12455
TAXIWAY INTERSECTION IMPROVEMENTS
DEMOLITION PLAN (1)

SHEET NO. C21 OF 41

TOTAL: 65

CAD FILE: 12444–MULTI–DEMO

DRAWING FILE NO. 4–141–47

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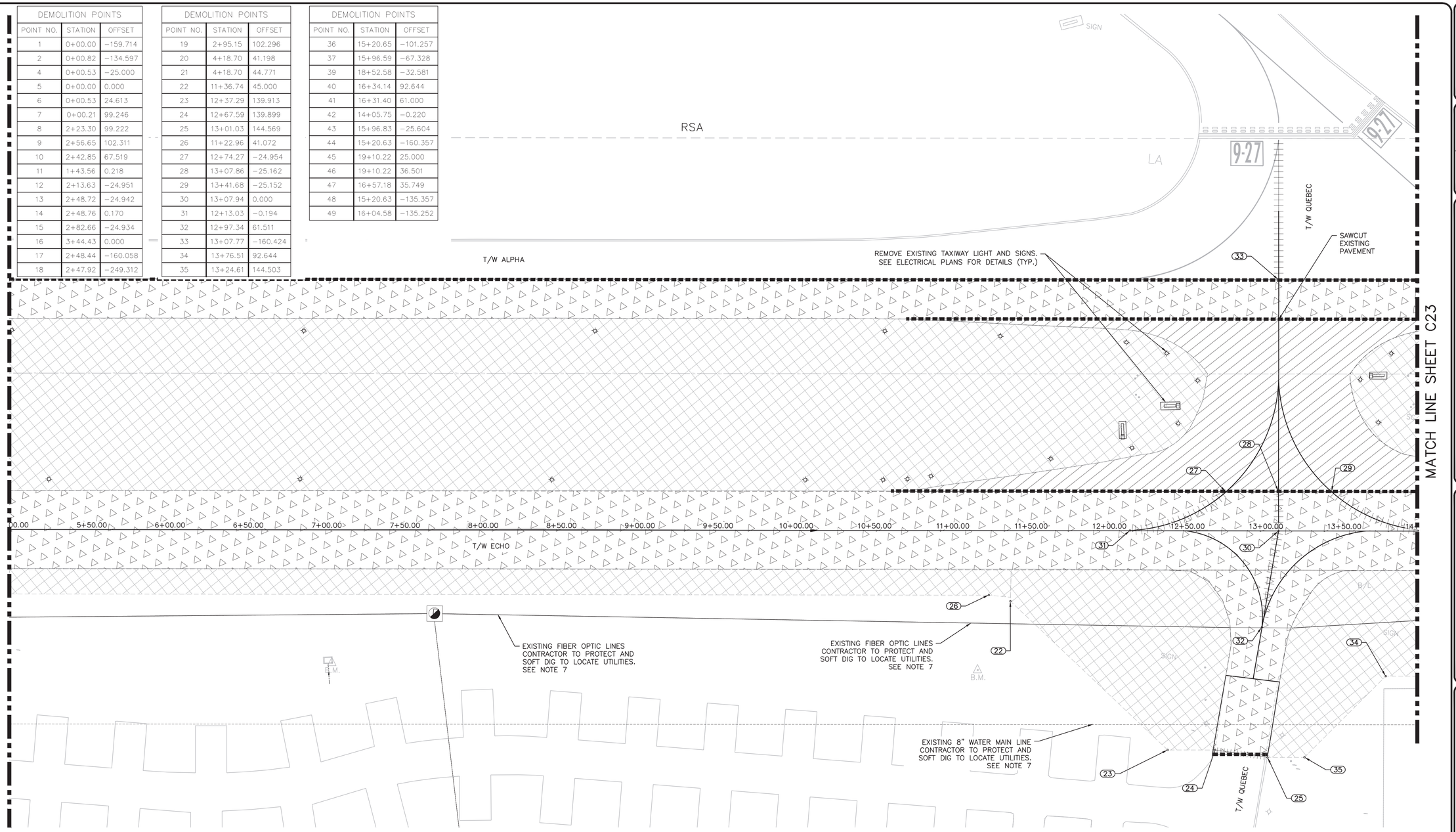

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CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

REVISIONS

NO.	DATE	BY	CHK'D	DESCRIPTION

PROJECT # 12455
TAXIWAY INTERSECTION IMPROVEMENTS
DEMOLITION PLAN (2)

SHEET NO.	OF
C22	41
TOTAL:	65
CAD FILE: 12444–MULTI–DEMO	
DRAWING FILE NO. 4–141–47	

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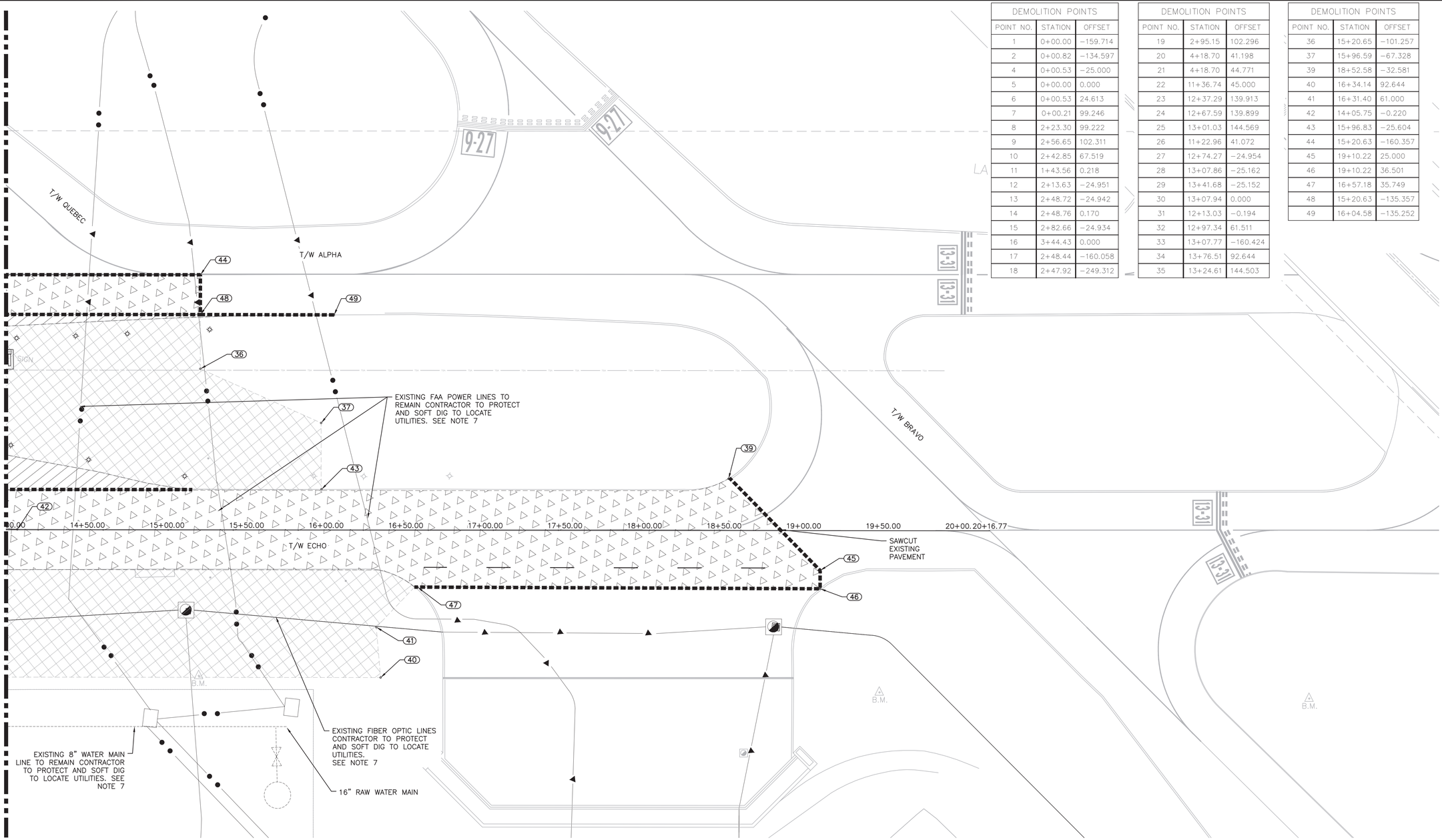

DEMOLITION POINTS		
POINT NO.	STATION	OFFSET
1	0+00.00	−159.714
2	0+00.82	−134.597
4	0+00.53	−25.000
5	0+00.00	0.000
6	0+00.53	24.613
7	0+00.21	99.246
8	2+23.30	99.222
9	2+56.65	102.311
10	2+42.85	67.519
11	1+43.56	0.218
12	2+13.63	−24.951
13	2+48.72	−24.942
14	2+48.76	0.170
15	2+82.66	−24.934
16	3+44.43	0.000
17	2+48.44	−160.058
18	2+47.92	−249.312

DEMOLITION POINTS		
POINT NO.	STATION	OFFSET
19	2+95.15	102.296
20	4+18.70	41.198
21	4+18.70	44.771
22	11+36.74	45.000
23	12+37.29	139.913
24	12+67.59	139.899
25	13+01.03	144.569
26	11+22.96	41.072
27	12+74.27	−24.954
28	13+07.86	−25.162
29	13+41.68	−25.152
30	13+07.94	0.000
31	12+13.03	−0.194
32	12+97.34	61.511
33	13+07.77	−160.424
34	13+76.51	92.644
35	13+24.61	144.503

DEMOLITION POINTS		
POINT NO.	STATION	OFFSET
36	15+20.65	−101.257
37	15+96.59	−67.328
39	18+52.58	−32.581
40	16+34.14	92.644
41	16+31.40	61.000
42	14+05.75	−0.220
43	15+96.83	−25.604
44	15+20.63	−160.357
45	19+10.22	25.000
46	19+10.22	36.501
47	16+57.18	35.749
48	15+20.63	−135.357
49	16+04.58	−135.252

LEGEND (SYMBOL)

- AIRPORT SIGN ON CONCRETE PAD
- BENCH MARK
- TAXIWAY LIGHT
- ELECTRIC BOXES
- LIGHTINING ARRESTER
- BENCHMARK
- SPOT ELEVATION
- RSA — RUNWAY SAFETY AREA
- TSA — TAXIWAY SAFETY AREA
- TOFA — TAXIWAY OBJECT FREE AREA

LEGEND (WORK)

- ASPHALT PAVEMENT REMOVAL. REFER TO PAVEMENT GEOMETRY PLANS SHEETS C25 −C27
- CLEARING AND GRUBBING.
- MILLING AND OVERLAYING
- SAW CUT EXISTING PAVEMENT
- REMOVE EXISTING PAVEMENT MARKING
- REMOVE EXISTING SURFACE PAINTED SIGN

DEMOLITION NOTES

1. EXPOSED SUBGRADE AND BASE MATERIAL TO BE KEPT MOIST AND COMPACTED TO MINIMIZE FOD FROM JET BLAST AND SHALL BE TREATED WITH A DUST STABILIZER WHEN REQUESTED BY THE ENGINEER. ALL DUST CONTROL RELATED COSTS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AND CONSIDERED INCIDENTAL TO ITEM P−156.
2. CONTRACTOR WILL PROTECT ALL EXISTING CONCRETE OR ASPHALT PAVEMENT TO REMAIN IN PLACE DURING MILLING AND FULL DEPTH PAVEMENT REMOVAL. ALL CONCRETE OR ASPHALT PAVEMENT DAMAGED DURING MILLING AND REMOVAL SHALL BE REPAIRED OR REPLACED AT THE CONTRACTOR'S EXPENSE BY A METHOD SATISFACTORY TO THE ENGINEE
3. CONTRACTOR SHALL USE A METHOD OF MARKING REMOVAL THAT DOES NOT DAMAGE THE EXISTING PAVEMENT AND JOINT SEALS. ANY DAMAGE CAUSED TO THE EXISTING PAVEMENT AND JOINT SEALS SHALL BE REPAIRED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER.
4. CONTRACTOR SHALL PROTECT ALL MARKINGS TO REMAIN. ANY MARKINGS THAT ARE DAMAGED OR INADVERTENTLY REMOVED SHALL BE REPAINTED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER.
5. CONTRACTOR SHALL PROTECT ALL IN−PAVEMENT CENTERLINE LIGHTS, AND EDGE LIGHTS, FAA FACILITIES, NAVAIDS AND CABLES AT ALL TIMES DURING CONSTRUCTION. HAND DIG AROUND FAA CABLES.
6. REFER TO SHEETS E04−E06 FOR ELECTRICAL DEMOLITION
7. EXISTING RAW WATER MAIN AND FIBER OPTIC LINE TO BE PROTECTED THROUGH DURATION OF WORK.

UTILITIES NOTE:

1. UNDERGROUND UTILITY LOCATIONS ARE APPROXIMATE. CONTRACTOR TO OBTAIN UNDERGROUND UTILITY LOCATION AS REQUIRED BY LAW. SEE GENERAL NOTES SHEET C01. ALL FACILITIES ARE TO REMAIN EXCEPT WHERE OTHERWISE SHOWN. TAKE CARE DURING CONSTRUCTION TO AVOID DAMAGE TO EXISTING ABOVE GROUND AND UNDERGROUND FACILITIES.

0 30' 60'

CALL 48 HOURS BEFORE YOU DIG
IT'S THE LAW! DIAL 811
811 Know what's below. Call before you dig.
SUNSHINE STATE ONE CALL OF FLORIDA, INC.
CALL 48 HOURS BEFORE DIGGING FAA FACILITIES 954-356-7212

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600 N. PINE ISLAND RD, SUITE 450, PLANTATION, FL 33324
FBPE No. CA 00000696
JOB NO. 044693067

HILLERS ELECTRICAL ENGINEERING, INC.
22257 STATE ROAD 7, SUITE 100
BOCA RATON, FLORIDA 33428
(561) 451-0165 PHONE
(561) 451-4886 FAX

BID SET

State of Florida
Professional Engineer
License No. 62478
THOMAS F. O'DONNELL

DRAWN BY: MEM | DESIGNED BY: MEM | CHECKED BY: TFO | DATE: 01/22/2021 | SCALE: AS NOTED | FIELD BOOK:

CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

REVISIONS

NO.	DATE	BY	CHK'D	DESCRIPTION

PROJECT # 12455
TAXIWAY INTERSECTION IMPROVEMENTS
DEMOLITION PLAN (3)

SHEET NO. C23 OF 41
TOTAL: 65
CAD FILE: 12444−MULTI−DEMO
DRAWING FILE NO. 4−141−47

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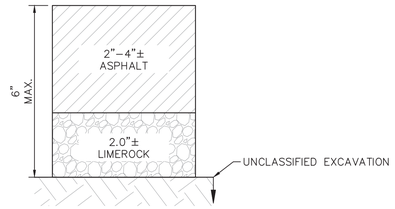
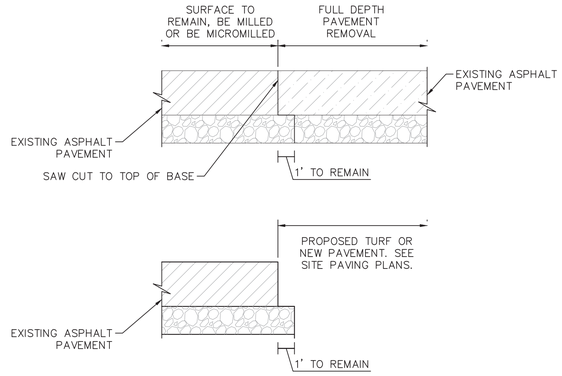
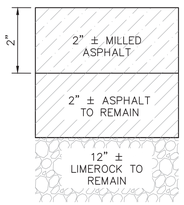


DEMO DETAIL 1 – FULL DEPTH ASPHALT PAVEMENT REMOVAL
EXISTING CONNECTORS (HOTEL AND QUEBEC)
N.T.S.



DEMO DETAIL 2 – FULL DEPTH ASPHALT PAVEMENT REMOVAL ADJACENT TO
ASPHALT PAVEMENT TO REMAIN
N.T.S.



DEMO DETAIL 3 – 2" MILLED PAVEMENT (ECHO)
N.T.S.

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1920 WEKIVA WAY, SUITE 200, WEST PALM BEACH, FL 33411
FBPE No. CA 00000696
JOB NO. 044693067

HILLERS ELECTRICAL
ENGINEERING, INC.
5285T STATE ROAD 7, SUITE 100
BOCA RATON, FLORIDA 33428
(561) 451-9155 PHONE
(561) 451-4686 FAX

BID SET

ENGINEER: THOMAS F. O'DONNELL
REG. No: 62478
DATE:
TEL: 561-840-0825
FAX:

DRAWN BY:	DATE:
MEM	01/22/2021
DESIGNED BY:	SCALE:
MEM	AS NOTED
CHECKED BY:	FIELD BOOK:
TFO	

CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

REVISIONS

NO.	DATE	BY	CHK'D	DESCRIPTION

PROJECT # 12455
TAXIWAY INTERSECTION
IMPROVEMENTS
PAVEMENT DEMOLITION DETAILS

SHEET NO.	OF
C24	41

TOTAL: 65

CAD FILE: 12444–C24–DETL

DRAWING FILE NO. 4–141–47

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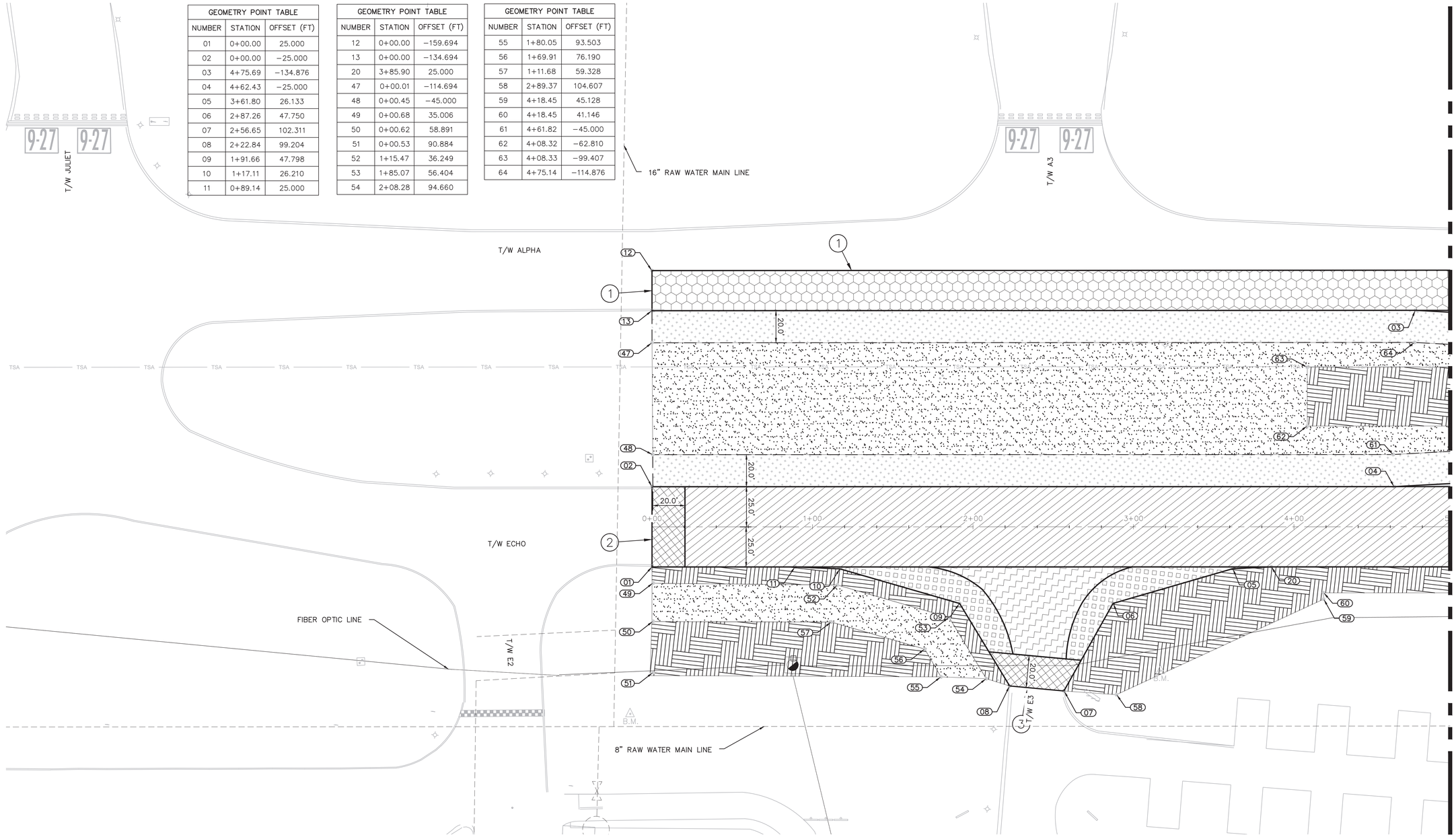
GEOMETRY POINT TABLE		
NUMBER	STATION	OFFSET (FT)
01	0+00.00	25.000
02	0+00.00	−25.000
03	4+75.69	−134.876
04	4+62.43	−25.000
05	3+61.80	26.133
06	2+87.26	47.750
07	2+56.65	102.311
08	2+22.84	99.204
09	1+91.66	47.798
10	1+17.11	26.210
11	0+89.14	25.000

GEOMETRY POINT TABLE		
NUMBER	STATION	OFFSET (FT)
12	0+00.00	−159.694
13	0+00.00	−134.694
20	3+85.90	25.000
47	0+00.01	−114.694
48	0+00.45	−45.000
49	0+00.68	35.006
50	0+00.62	58.891
51	0+00.53	90.884
52	1+15.47	36.249
53	1+85.07	56.404
54	2+08.28	94.660

GEOMETRY POINT TABLE		
NUMBER	STATION	OFFSET (FT)
55	1+80.05	93.503
56	1+69.91	76.190
57	1+11.68	59.328
58	2+89.37	104.607
59	4+18.45	45.128
60	4+18.45	41.146
61	4+61.82	−45.000
62	4+08.32	−62.810
63	4+08.33	−99.407
64	4+75.14	−114.876



LEGEND (WORK)

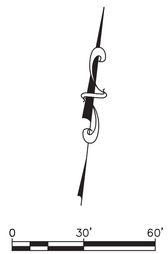
- CONSTRUCT NEW PAVEMENT SECTION TO GRADE. SEE TYPICAL SECTION NO. 1 ON SHEET C17
- MILL 2" AND OVERLAY TO GRADE. SEE TYPICAL SECTION NO. 2 ON SHEET C17
- MILL 1 1/4" AND OVERLAY TO GRADE. SEE TYPICAL SECTION NO. 3 ON SHEET C17
- MILL VARIABLE DEPTH (1 1/2" MIN.) AND OVERLAY TO GRADE. SEE TYPICAL SECTION NO. 3 ON SHEET C17
- BUTT JOINT OVERLAY TRANSITION TO EXISTING. SEE DETAIL 2 SHEET C18
- CONSTRUCT STABILIZED SUBGRADE (P−154) ON SHOULDER. SOD 20' ADJACENT TO PAVEMENT EDGE. SEE TYPICAL SECTIONS SHEET C17
- INSTALL SOD IN GRADED INFIELDS
- INSTALL HYDROSEED IN FLAT AREAS OF INFIELD
- CONSTRUCT NEW PAVEMENT SECTION TO GRADE SEE TYPICAL SECTION NO. 3 ON SHEET C17
- (1) BUTT JOINT TO EXISTING. SEE DETAIL 1 SHEET C18

LEGEND (SYMBOL)

- BENCHMARK
- AIRFIELD GUIDANCE SIGN
- TAXIWAY LIGHT
- RUNWAY LIGHT
- JUNCTION CAN
- JUNCTION CAN PLAZA
- PULLBOX
- FIBER COMM CABINET
- 11.00' EXISTING CONTOUR
- RSA RUNWAY SAFETY AREA
- TSA TAXIWAY SAFETY AREA
- TOFA TAXIWAY OBJECT FREE AREA

NOTES

1. UNDERGROUND UTILITY LOCATIONS ARE APPROXIMATE. CONTRACTOR TO OBTAIN UNDERGROUND UTILITY LOCATION AS REQUIRED BY LAW. SEE GENERAL NOTES SHEET C01. ALL FACILITIES ARE TO REMAIN EXCEPT WHERE OTHERWISE SHOWN. TAKE CARE DURING CONSTRUCTION TO AVOID DAMAGE TO EXISTING ABOVE GROUND AND UNDERGROUND FACILITIES.
2. SEE "TYPICAL SECTIONS" SHEETS. C17 – C18.
3. CONTRACTOR WILL PROTECT ALL TAXIWAY EDGE LIGHTS DURING CONSTRUCTION.
4. IN CASE WHERE GEOMETRY IS NOT DELINEATED BY STATION/OFFSET OR NORTHING/EASTING, IT SHALL MATCH THE EXISTING LAYOUT OF THE MILLED EDGE OF PAVEMENT.
5. REFER TO THE ELECTRICAL PLAN SHEETS FOR TAXIWAY EDGE LIGHTS AND SIGNS TO BE RELOCATED



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600 N. PINE ISLAND RD, SUITE 450, PLANTATION, FL 33324
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HILLERS ELECTRICAL ENGINEERING, INC.
23257 STATE ROAD 7, SUITE 100
BOCA RATON, FLORIDA 33428
(561) 451-9165 PHONE
(561) 451-4886 FAX

BID SET

State of Florida
Professional Engineer
License No. 62478
THOMAS F. O'DONNELL

DRAWN BY:	DATE:
MEM	01/22/2021
DESIGNED BY:	SCALE:
MEM	AS NOTED
CHECKED BY:	
TFO	
FIELD BOOK:	

CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

REVISIONS			
NO.	DATE	BY	CHK'D

PROJECT # 12455
TAXIWAY INTERSECTION IMPROVEMENTS
PAVEMENT GEOMETRY PLAN (1)

SHEET NO.	OF
C25	41
TOTAL:	65

CAD FILE: 12444−MULTI−GEOM
DRAWING FILE NO. 4−141−47

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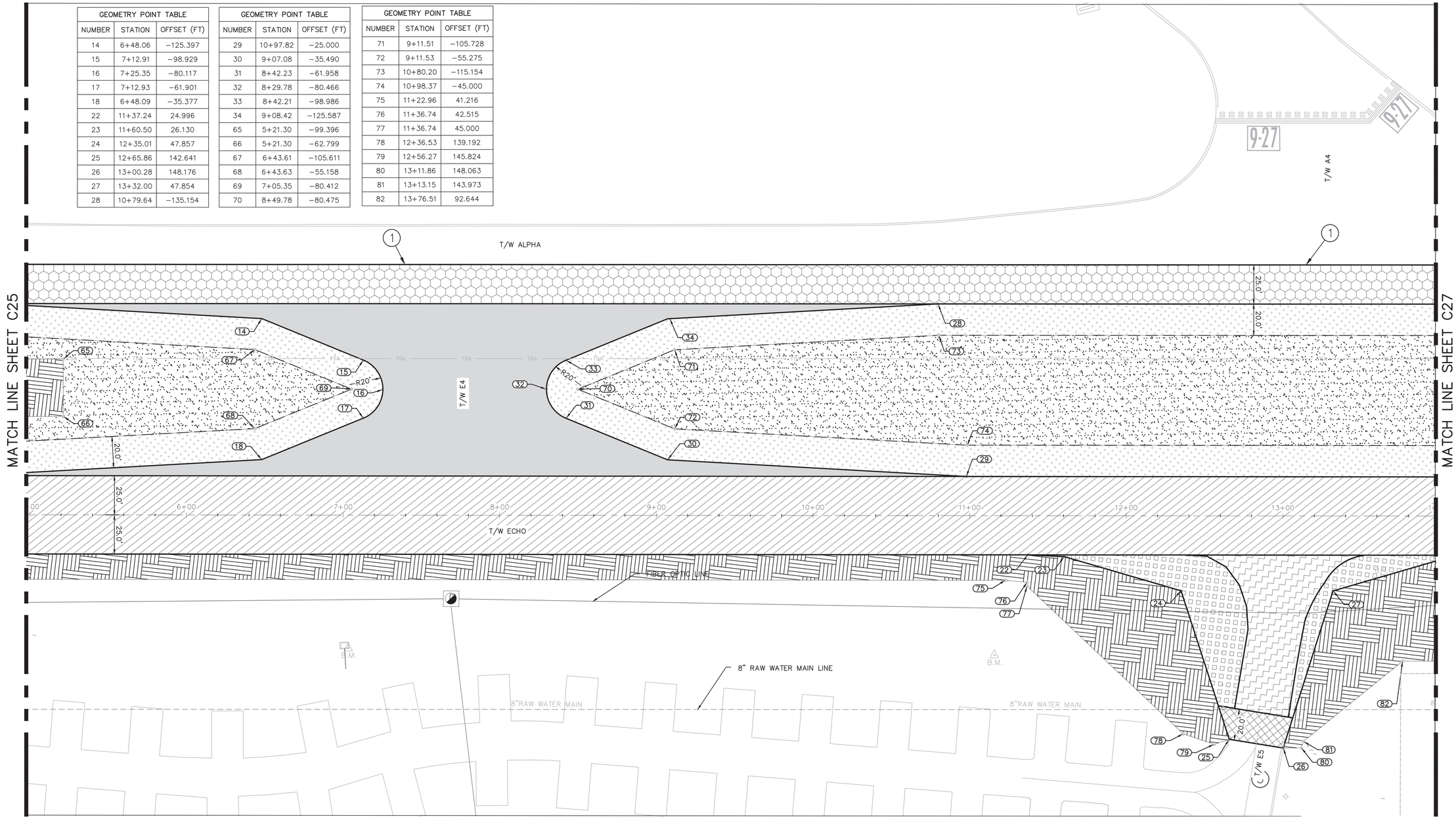
GEOMETRY POINT TABLE		
NUMBER	STATION	OFFSET (FT)
14	6+48.06	−125.397
15	7+12.91	−98.929
16	7+25.35	−80.117
17	7+12.93	−61.901
18	6+48.09	−35.377
22	11+37.24	24.996
23	11+60.50	26.130
24	12+35.01	47.857
25	12+65.86	142.641
26	13+00.28	148.176
27	13+32.00	47.854
28	10+79.64	−135.154

GEOMETRY POINT TABLE		
NUMBER	STATION	OFFSET (FT)
29	10+97.82	−25.000
30	9+07.08	−35.490
31	8+42.23	−61.958
32	8+29.78	−80.466
33	8+42.21	−98.986
34	9+08.42	−125.587
65	5+21.30	−99.396
66	5+21.30	−62.799
67	6+43.61	−105.611
68	6+43.63	−55.158
69	7+05.35	−80.412
70	8+49.78	−80.475

GEOMETRY POINT TABLE		
NUMBER	STATION	OFFSET (FT)
71	9+11.51	−105.728
72	9+11.53	−55.275
73	10+80.20	−115.154
74	10+98.37	−45.000
75	11+22.96	41.216
76	11+36.74	42.515
77	11+36.74	45.000
78	12+36.53	139.192
79	12+56.27	145.824
80	13+11.86	148.063
81	13+13.15	143.973
82	13+76.51	92.644



LEGEND (WORK)

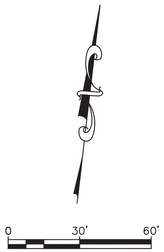
- CONSTRUCT NEW PAVEMENT SECTION TO GRADE. SEE TYPICAL SECTION NO. 1 ON SHEET C17
- MILL 2" AND OVERLAY TO GRADE. SEE TYPICAL SECTION NO. 2 ON SHEET C17
- MILL 1 1/4" AND OVERLAY TO GRADE. SEE TYPICAL SECTION NO. 3 ON SHEET C17
- MILL VARIABLE DEPTH (1 1/2" MIN.) AND OVERLAY TO GRADE. SEE TYPICAL SECTION NO. 3 ON SHEET C17
- BUTT JOINT OVERLAY TRANSITION TO EXISTING. SEE DETAIL 2 SHEET C18
- CONSTRUCT STABILIZED SUBGRADE (P−154) ON SHOULDER. SOD 20' ADJACENT TO PAVEMENT EDGE. SEE TYPICAL SECTIONS SHEET C17
- INSTALL SOD IN GRADED INFIELDS
- INSTALL HYDROSEED IN FLAT AREAS OF INFIELD
- CONSTRUCT NEW PAVEMENT SECTION TO GRADE SEE TYPICAL SECTION NO. 3 ON SHEET C17
- (1) BUTT JOINT TO EXISTING. SEE DETAIL 1 SHEET C18

LEGEND (SYMBOL)

- BENCHMARK
- AIRFIELD GUIDANCE SIGN
- TAXIWAY LIGHT
- RUNWAY LIGHT
- JUNCTION CAN
- JUNCTION CAN PLAZA
- PULLBOX
- FIBER COMM CABINET
- 11.00' EXISTING CONTOUR
- RSA RUNWAY SAFETY AREA
- TSA TAXIWAY SAFETY AREA
- TOFA TAXIWAY OBJECT FREE AREA

NOTES

1. UNDERGROUND UTILITY LOCATIONS ARE APPROXIMATE. CONTRACTOR TO OBTAIN UNDERGROUND UTILITY LOCATION AS REQUIRED BY LAW. SEE GENERAL NOTES SHEET C01. ALL FACILITIES ARE TO REMAIN EXCEPT WHERE OTHERWISE SHOWN. TAKE CARE DURING CONSTRUCTION TO AVOID DAMAGE TO EXISTING ABOVE GROUND AND UNDERGROUND FACILITIES.
2. SEE "TYPICAL SECTIONS" SHEETS. C17 – C18.
3. CONTRACTOR WILL PROTECT ALL TAXIWAY EDGE LIGHTS DURING CONSTRUCTION.
4. IN CASE WHERE GEOMETRY IS NOT DELINEATED BY STATION/OFFSET OR NORTHING/EASTING, IT SHALL MATCH THE EXISTING LAYOUT OF THE MILLED EDGE OF PAVEMENT.
5. REFER TO THE ELECTRICAL PLAN SHEETS FOR TAXIWAY EDGE LIGHTS AND SIGNS TO BE RELOCATED



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DRAWN BY:	DATE:
MEM	01/22/2021
DESIGNED BY:	SCALE:
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REVISIONS

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PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

PROJECT # 12455
TAXIWAY INTERSECTION IMPROVEMENTS
PAVEMENT GEOMETRY PLAN (2)

SHEET NO.	OF
C26	41

TOTAL: 65

CAD FILE: 12444−MULTI−GEOM

DRAWING FILE NO. 4−141−47

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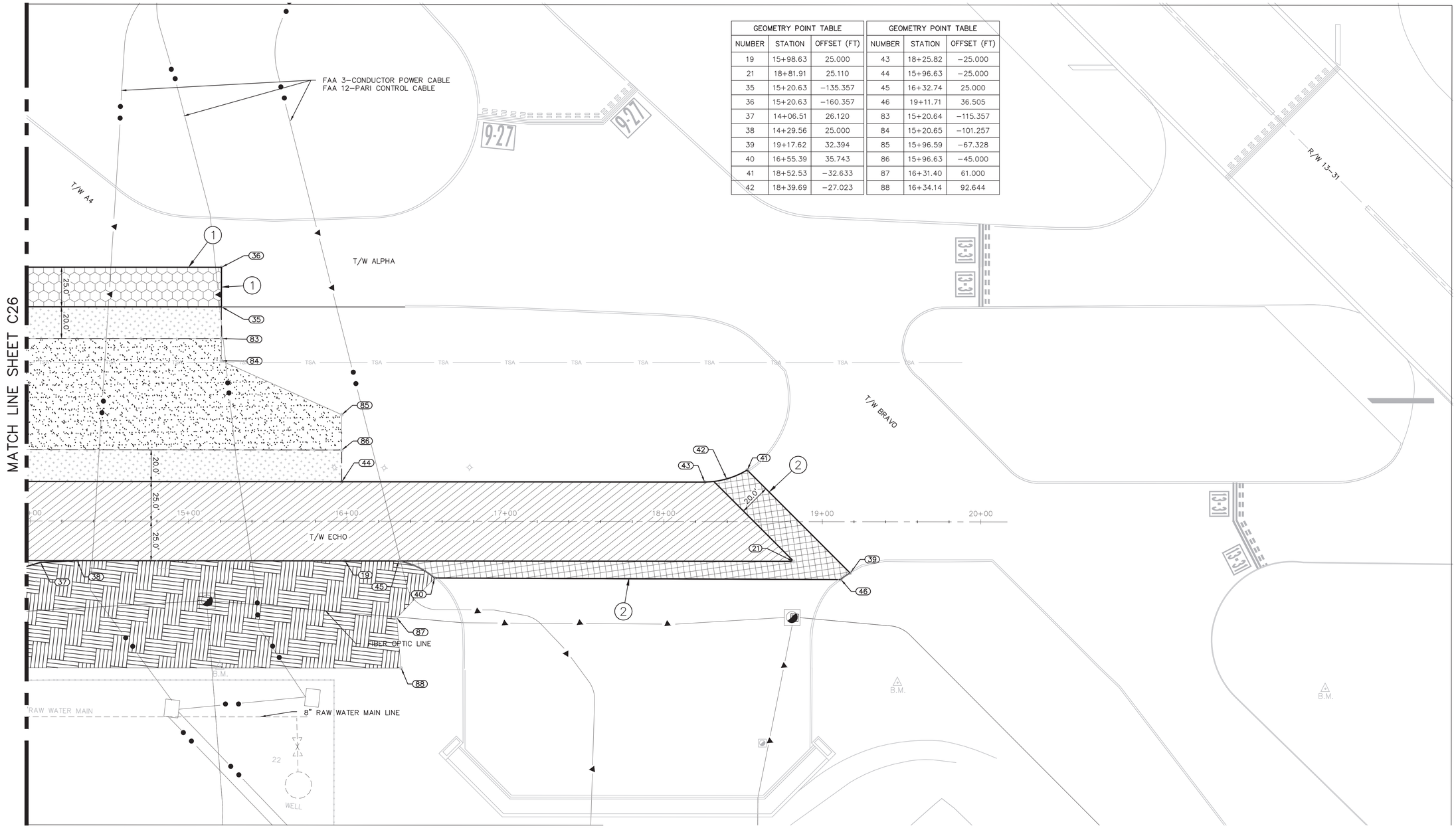


GEOMETRY POINT TABLE		
NUMBER	STATION	OFFSET (FT)
19	15+98.63	25.000
21	18+81.91	25.110
35	15+20.63	–135.357
36	15+20.63	–160.357
37	14+06.51	26.120
38	14+29.56	25.000
39	19+17.62	32.394
40	16+55.39	35.743
41	18+52.53	–32.633
42	18+39.69	–27.023

GEOMETRY POINT TABLE		
NUMBER	STATION	OFFSET (FT)
43	18+25.82	–25.000
44	15+96.63	–25.000
45	16+32.74	25.000
46	19+11.71	36.505
83	15+20.64	–115.357
84	15+20.65	–101.257
85	15+96.59	–67.328
86	15+96.63	–45.000
87	16+31.40	61.000
88	16+34.14	92.644

LEGEND (WORK)

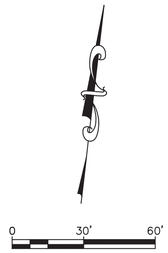
- CONSTRUCT NEW PAVEMENT SECTION TO GRADE. SEE TYPICAL SECTION NO. 1 ON SHEET C17
- MILL 2" AND OVERLAY TO GRADE. SEE TYPICAL SECTION NO. 2 ON SHEET C17
- MILL 1 1/4" AND OVERLAY TO GRADE. SEE TYPICAL SECTION NO. 3 ON SHEET C17
- MILL VARIABLE DEPTH (1 1/2" MIN.) AND OVERLAY TO GRADE. SEE TYPICAL SECTION NO. 3 ON SHEET C17
- BUTT JOINT OVERLAY TRANSITION TO EXISTING. SEE DETAIL 2 SHEET C18
- CONSTRUCT STABILIZED SUBGRADE (P–154) ON SHOULDER. SOD 20' ADJACENT TO PAVEMENT EDGE. SEE TYPICAL SECTIONS SHEET C17
- INSTALL SOD IN GRADED INFIELDS
- INSTALL HYDROSEED IN FLAT AREAS OF INFIELD
- CONSTRUCT NEW PAVEMENT SECTION TO GRADE SEE TYPICAL SECTION NO. 3 ON SHEET C17
- (1) BUTT JOINT TO EXISTING. SEE DETAIL 1 SHEET C18

LEGEND (SYMBOL)

- BENCHMARK
- AIRFIELD GUIDANCE SIGN
- TAXIWAY LIGHT
- RUNWAY LIGHT
- JUNCTION CAN
- JUNCTION CAN PLAZA
- PULLBOX
- FIBER COMM CABINET
- 11.00 EXISTING CONTOUR
- RSA RUNWAY SAFETY AREA
- TSA TAXIWAY SAFETY AREA
- TOFA TAXIWAY OBJECT FREE AREA

NOTES

1. UNDERGROUND UTILITY LOCATIONS ARE APPROXIMATE. CONTRACTOR TO OBTAIN UNDERGROUND UTILITY LOCATION AS REQUIRED BY LAW. SEE GENERAL NOTES SHEET C01. ALL FACILITIES ARE TO REMAIN EXCEPT WHERE OTHERWISE SHOWN. TAKE CARE DURING CONSTRUCTION TO AVOID DAMAGE TO EXISTING ABOVE GROUND AND UNDERGROUND FACILITIES.
2. SEE "TYPICAL SECTIONS" SHEETS. C17 – C18.
3. CONTRACTOR WILL PROTECT ALL TAXIWAY EDGE LIGHTS DURING CONSTRUCTION.
4. IN CASE WHERE GEOMETRY IS NOT DELINEATED BY STATION/OFFSET OR NORTHING/EASTING, IT SHALL MATCH THE EXISTING LAYOUT OF THE MILLED EDGE OF PAVEMENT.
5. REFER TO THE ELECTRICAL PLAN SHEETS FOR TAXIWAY EDGE LIGHTS AND SIGNS TO BE RELOCATED



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JOB NO. 044693067

HILLERS ELECTRICAL ENGINEERING, INC.
23257 STATE ROAD 7, SUITE 100
BOCA RATON, FLORIDA 33428
(561) 451-9165 PHONE
(561) 451-4886 FAX

BID SET

State of Florida
Professional Engineer
License No. 62478
THOMAS F. O'DONNELL

DRAWN BY: MEM | DESIGNED BY: MEM | DATE: 01/22/2021 | SCALE: AS NOTED | CHECKED BY: TFO | FIELD BOOK:

REVISIONS

NO.	DATE	BY	CHK'D	DESCRIPTION

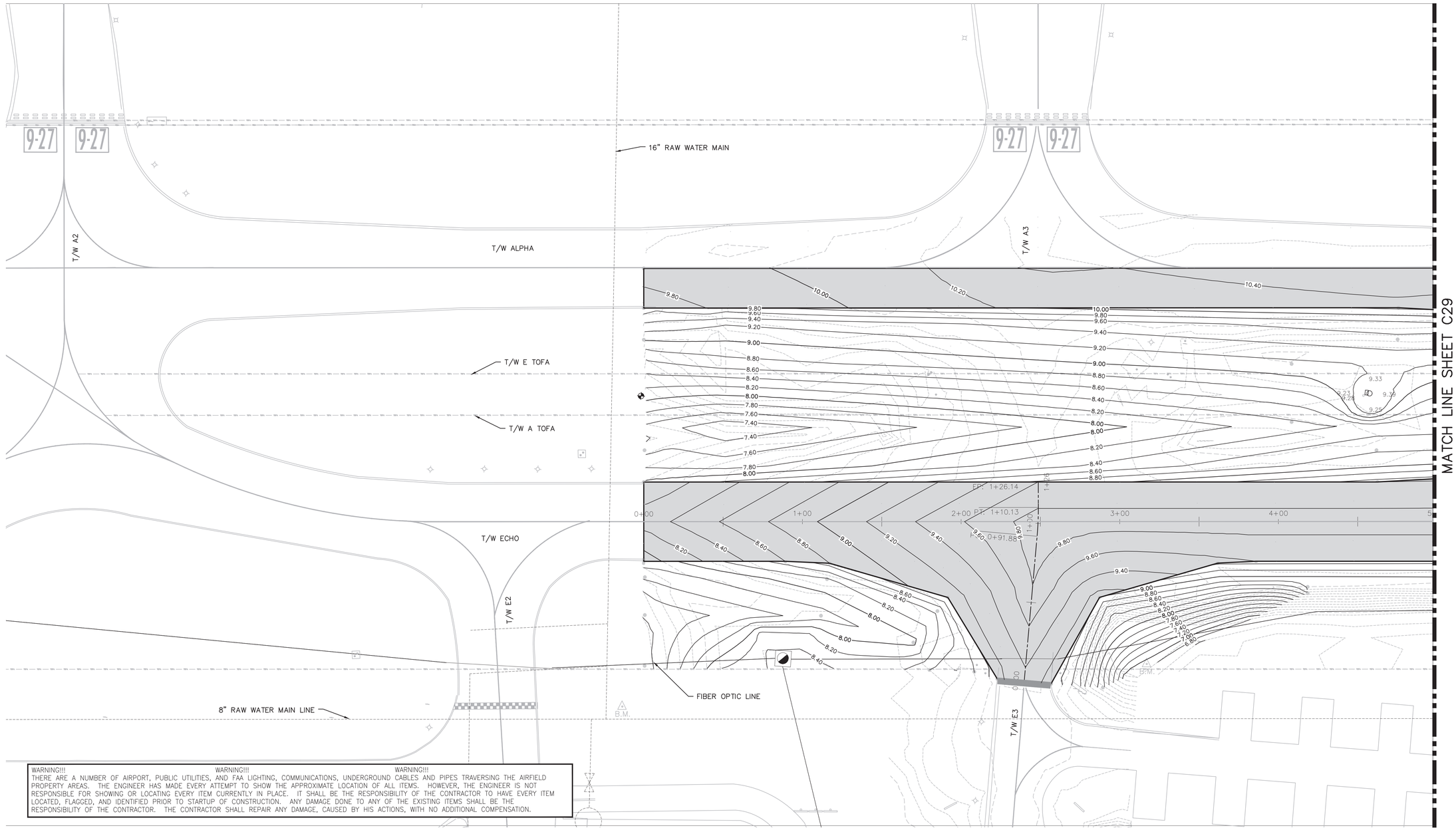
CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

PROJECT # 12455
TAXIWAY INTERSECTION IMPROVEMENTS
PAVEMENT GEOMETRY PLAN (3)

SHEET NO. C27 OF 41
TOTAL: 65
CAD FILE: 12444–MULTI–GEOM
DRAWING FILE NO. 4–141–47

K:\FTL_AVIATION\044693067 – TW E H & Q IMPROVEMENTS\CADD\PLANSHEETS\12444–MULTI–GEOM.DWG

6/16/2021 10:35 AM



MATCH LINE SHEET C29

WARNING!!! WARNING!!! WARNING!!!
THERE ARE A NUMBER OF AIRPORT, PUBLIC UTILITIES, AND FAA LIGHTING, COMMUNICATIONS, UNDERGROUND CABLES AND PIPES TRAVERSING THE AIRFIELD PROPERTY AREAS. THE ENGINEER HAS MADE EVERY ATTEMPT TO SHOW THE APPROXIMATE LOCATION OF ALL ITEMS. HOWEVER, THE ENGINEER IS NOT RESPONSIBLE FOR SHOWING OR LOCATING EVERY ITEM CURRENTLY IN PLACE. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO HAVE EVERY ITEM LOCATED, FLAGGED, AND IDENTIFIED PRIOR TO STARTUP OF CONSTRUCTION. ANY DAMAGE DONE TO ANY OF THE EXISTING ITEMS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR SHALL REPAIR ANY DAMAGE, CAUSED BY HIS ACTIONS, WITH NO ADDITIONAL COMPENSATION.

LEGEND

- B.M. — BENCHMARK
- ELECTRIC HAND HOLE
- TAXIWAY SIGN
- TAXIWAY EDGE LIGHT
- COMMUNICATION VAULT
- CONCRETE PAD
- EXISTING FIBER PULL BOX
- EXISTING FIBER COMM CABINET
- FO — EXISTING FIBER OPTIC LINE
- 11.00' — EXISTING CONTOUR
- 13.00' — PROPOSED CONTOUR
- RSA — RUNWAY SAFETY AREA
- TSA — TAXIWAY SAFETY AREA
- 9.50 — PROPOSED ELEVATION
- APPROXIMATE LIMITS OF WORK

NOTES

1. UNDERGROUND UTILITY LOCATIONS ARE APPROXIMATE. CONTRACTOR TO OBTAIN UNDERGROUND UTILITY LOCATION AS REQUIRED BY LAW. SEE GENERAL NOTES SHEET C01. ALL FACILITIES ARE TO REMAIN EXCEPT WHERE OTHERWISE SHOWN. TAKE CARE DURING CONSTRUCTION TO AVOID DAMAGE TO EXISTING ABOVE GROUND AND UNDERGROUND FACILITIES.
2. CONTRACTOR SHALL GRADE AROUND ALL EXISTING STRUCTURES TO REMAIN, INCLUDING BUT NOT LIMITED TO TAXIWAY AND RUNWAY SIGNAGE, WIND SOCKS, DRAINAGE INLETS AND ELECTRICAL MANHOLES.
3. REFER TO SHEET C21 TO C23 FOR DEMOLITION REQUIREMENTS
4. SEE "TYPICAL SECTIONS" SHEET NOS. C17 & C18
5. CONTRACTOR WILL PROTECT ALL TAXIWAY EDGE LIGHTS DURING CONSTRUCTION.
6. IN CASE WHERE GEOMETRY IS NOT DELINEATED BY STATION/OFFSET, IT SHALL MATCH THE EXISTING LAYOUT OF THE MILLED EDGE OF PAVEMENT.
7. REFER TO THE ELECTRICAL PLAN SHEETS FOR TAXIWAY EDGE LIGHTS AND SIGNAGE TO BE RELOCATED.
8. REFER TO SHEET E-16 FOR SIGNS FILL AND GRADING DETAIL

THE ELEVATIONS SHOWN HEREON ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88). TO CONVERT THE ELEVATIONS HEREON TO NATIONAL GEODETIC VERTICAL DATUM (NGVD29) ADD 1.585 FEET.

0 30' 60'

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23257 STATE ROAD 7, SUITE 100
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(561) 451-9165 PHONE
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BID SET

State of Florida
Professional Engineer
License No. 62478
THOMAS F. O'DONNELL

DRAWN BY:	DATE:	SCALE:
MEM	01/22/2021	AS NOTED
DESIGNED BY: MEM	CHECKED BY: TFO	FIELD BOOK:

CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

REVISIONS

NO.	DATE	BY	CHK'D	DESCRIPTION

PROJECT # 12455
TAXIWAY INTERSECTION IMPROVEMENTS
GRADING PLAN (1)

SHEET NO.	OF
C28	41

TOTAL: 65

CAD FILE: 12444-MULTI-GRAD

DRAWING FILE NO. 4-141-47

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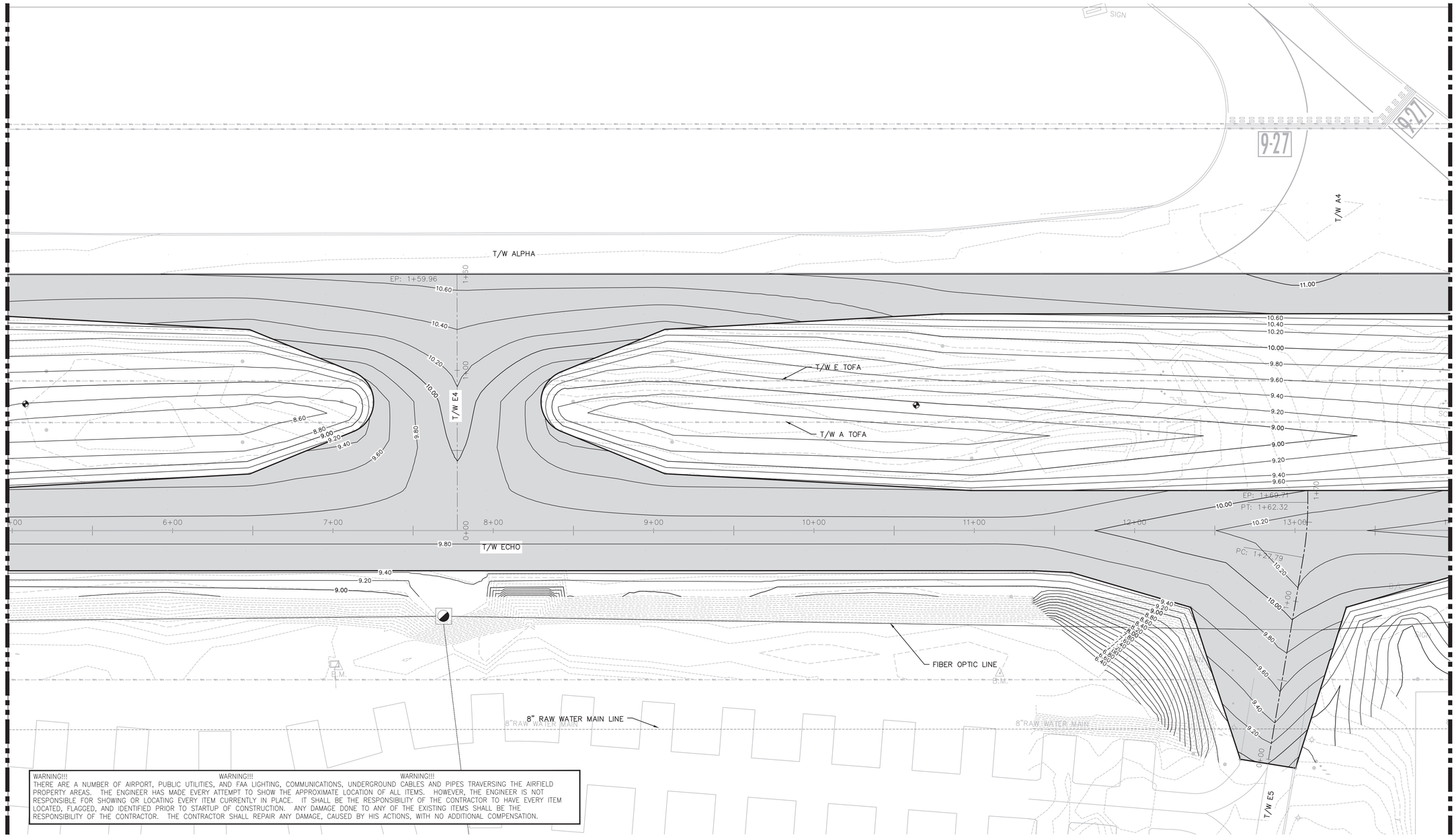
MATCH LINE SHEET C28

MATCH LINE SHEET C30



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- EXISTING FIBER COMM CABINET
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BID SET

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THOMAS F. O'DONNELL

DRAWN BY:	DATE:	SCALE:
MEM	01/22/2021	AS NOTED
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CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

REVISIONS

NO.	DATE	BY	CH'D	DESCRIPTION

PROJECT # 12455
TAXIWAY INTERSECTION IMPROVEMENTS
GRADING PLAN (2)

SHEET NO.	OF
C29	41

TOTAL: 65

CAD FILE: 12444–MULTI–GRAD

DRAWING FILE NO. 4–141–47

K:\FTL_AVIATION\044693067 – TW E H & Q IMPROVEMENTS\CADD\PLANSHEETS\12444–MULTI–GRAD.DWG

6/16/2021 10:35 AM

MATCH LINE SHEET C29

FAA 3-CONDUCTOR POWER CABLE
FAA 12-PAIR CONTROL CABLE

9-27

T/W A4

T/W ALPHA

11.00 11.20

SIGN

T/W E TOFA

T/W A TOFA

T/W BRAVO

R/W 13-31

13-31

10.40 10.60 10.80 11.00 11.20 11.40

15+00 16+00 17+00 18+00 19+00 20+00

T/W ECHO

9.80 9.60 9.40 9.20 9.00 9.20 9.40 9.60 9.80

FIBER OPTIC LINE

B.M.

8" RAW WATER MAIN LINE

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23257 STATE ROAD 7, SUITE 100
BOCA RATON, FLORIDA 33428
(561) 451-9165 PHONE
(561) 451-4886 FAX

BID SET

State of Florida
Professional Engineer
License No. 62478
THOMAS F. O'DONNELL

DRAWN BY:	DATE:	DESIGNED BY:	SCALE:
MEM	01/22/2021	MEM	AS NOTED
CHECKED BY:		FIELD BOOK:	
TFO			

CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

REVISIONS

NO.	DATE	BY	CHK'D	DESCRIPTION

PROJECT # 12455
TAXIWAY INTERSECTION IMPROVEMENTS
GRADING PLAN (3)

SHEET NO.	OF
C30	41

TOTAL: 65

CAD FILE: 12444-MULTI-GRAD

DRAWING FILE NO. 4-141-47

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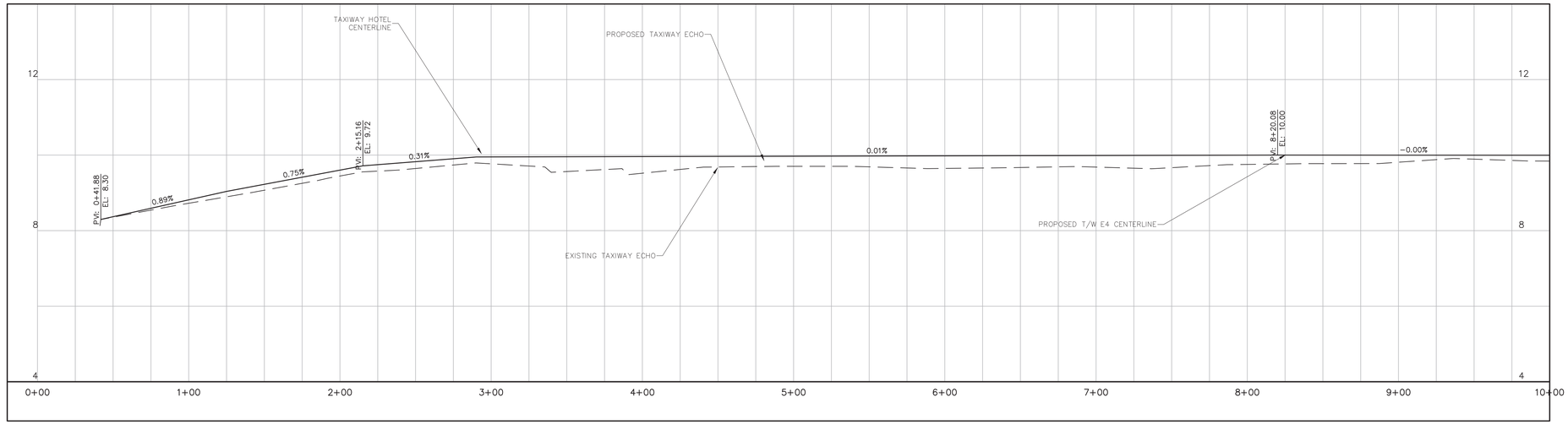
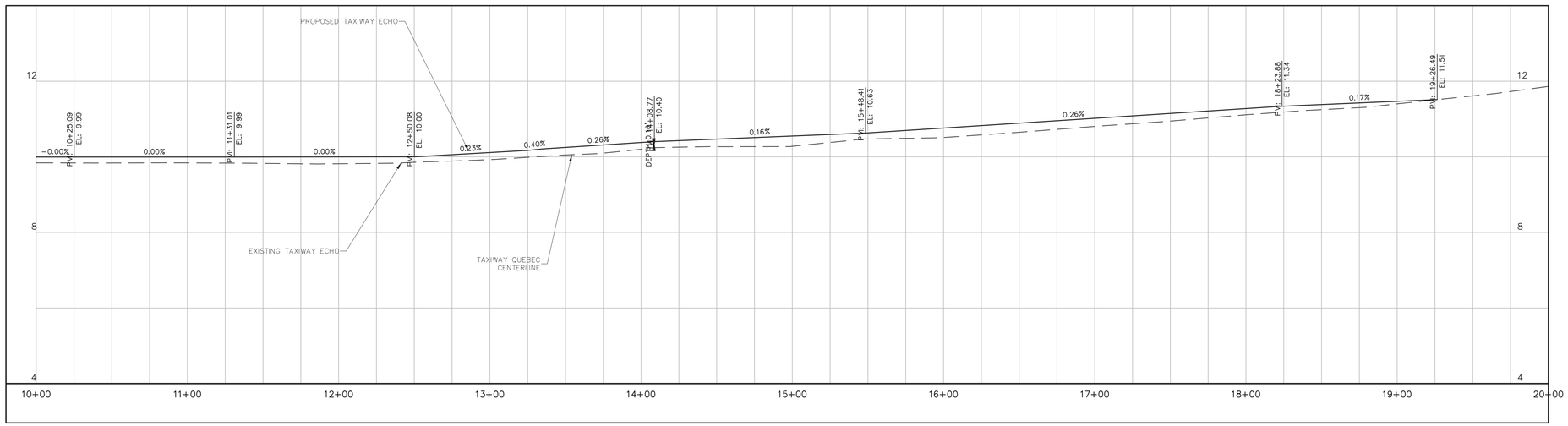


TAXIWAY ECHO STA 00+00.00 – 10+00.00



TAXIWAY ECHO STA 10+00.00' – 20+00.00

NOTES

1. REFERENCE SHEETS C25 – C27 FOR GEOMETRY LAYOUT.
2. UNDERGROUND UTILITY LOCATIONS ARE APPROXIMATE. CONTRACTOR TO OBTAIN UNDERGROUND UTILITY LOCATION AS REQUIRED BY LAW. SEE GENERAL NOTES SHEET C01. ALL FACILITIES ARE TO REMAIN EXCEPT WHERE OTHERWISE SHOWN. TAKE CARE DURING CONSTRUCTION TO AVOID DAMAGE TO EXISTING ABOVE GROUND AND UNDERGROUND FACILITIES.

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HILLERS ELECTRICAL ENGINEERING, INC.
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(561) 451-4886 FAX

ENGINEER: THOMAS F. O'DONNELL
REG. No: 62478
DATE:
TEL: 561-840-0825
FAX:

DRAWN BY: MEM | DATE: 01/22/2021
DESIGNED BY: MEM | SCALE: AS NOTED
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PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

REVISIONS

NO.	DATE	BY	CHK'D	DESCRIPTION

PROJECT # 12455
TAXIWAY INTERSECTION IMPROVEMENTS
TAXIWAY PROFILES (1)

BID SET

SHEET NO.	OF
C31	70

TOTAL: 103

CAD FILE: 12444-MULTI-PROF

DRAWING FILE NO. 4-141-47

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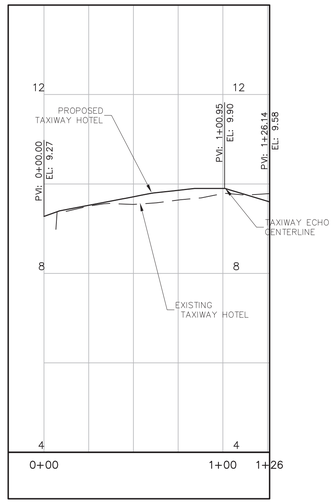
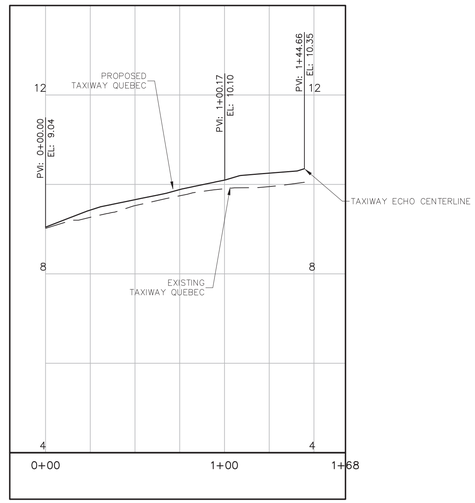
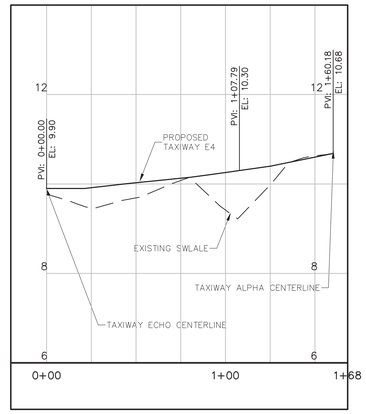


TAXIWAY HOTEL STA 00+00.00 – 1+01.13



TAXIWAY QUEBEC STA 00+00.00 – 01+42.63



TAXIWAY E4 STA 00+00.00 – 01+68.28

NOTES

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HILLERS ELECTRICAL ENGINEERING, INC.
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(561) 451-9155 PHONE
(561) 451-4686 FAX

BID SET

ENGINEER: THOMAS F. O'DONNELL
REG. No: 62478
DATE:
TEL: 561-840-0825
FAX:

DRAWN BY: MEM | DATE: 01/22/2021
DESIGNED BY: MEM | SCALE: ########
CHECKED BY: TFO | FIELD BOOK:

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REVISIONS

NO.	DATE	BY	CHK'D	DESCRIPTION

PROJECT # 12455
TAXIWAY INTERSECTION
IMPROVEMENTS
TAXIWAY PROFILES (2)

SHEET NO. C32 OF 70

TOTAL: 103

CAD FILE: 12444-MULTI-PROF

DRAWING FILE NO. 4-141-47

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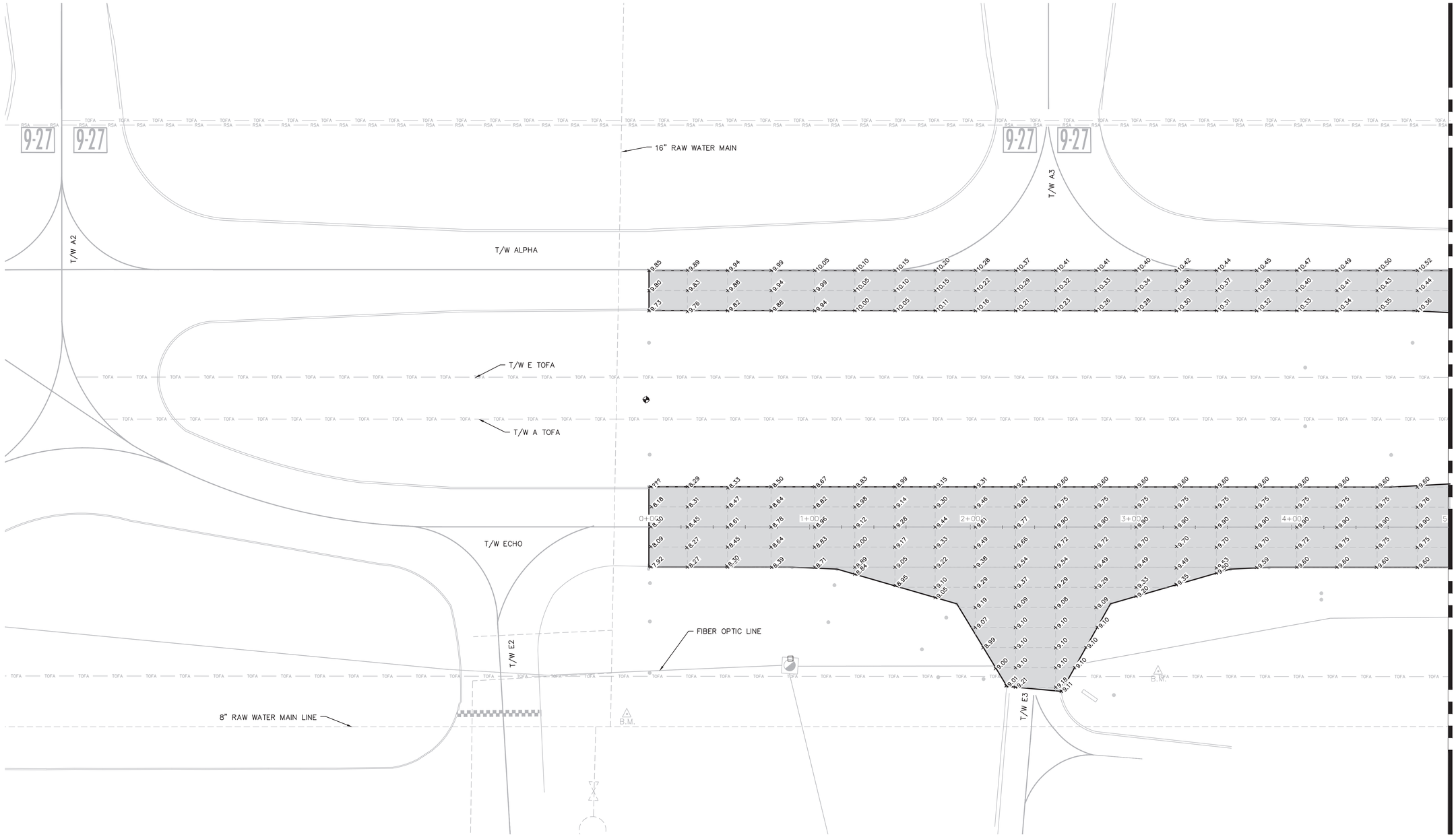

MATCH LINE SHEET C34

LEGEND (WORK)

CONSTRUCT NEW PAVEMENT SECTION TO GRADE

LEGEND (SYMBOL)

+11.6 SPOT ELEVATION

RSA RUNWAY SAFETY AREA

TSA TAXIWAY SAFETY AREA

TOFA TAXIWAY OBJECT FREE AREA

NOTES

1. REFER TO SHEETS C25 TO C27 FOR PAVING AND GEOMETRY PLANS.
2. REFER TO SHEETS C28 TO C30 FOR GRADING PLANS.
3. REFER TO SHEET C21 TO C23 FOR DEMOLITION REQUIREMENTS
4. SEE "TYPICAL SECTIONS" SHEET NOS. C17 & C18

0 30' 60'

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NO.	DATE	BY	CHK'D	DESCRIPTION

REVISIONS

PROJECT # 12455
TAXIWAY INTERSECTION IMPROVEMENTS
SPOT ELEVATION PLAN (1)

SHEET NO.	OF
C33	41

TOTAL: 65

CAD FILE: 12444-MULTI-ELEV

DRAWING FILE NO. 4-141-47

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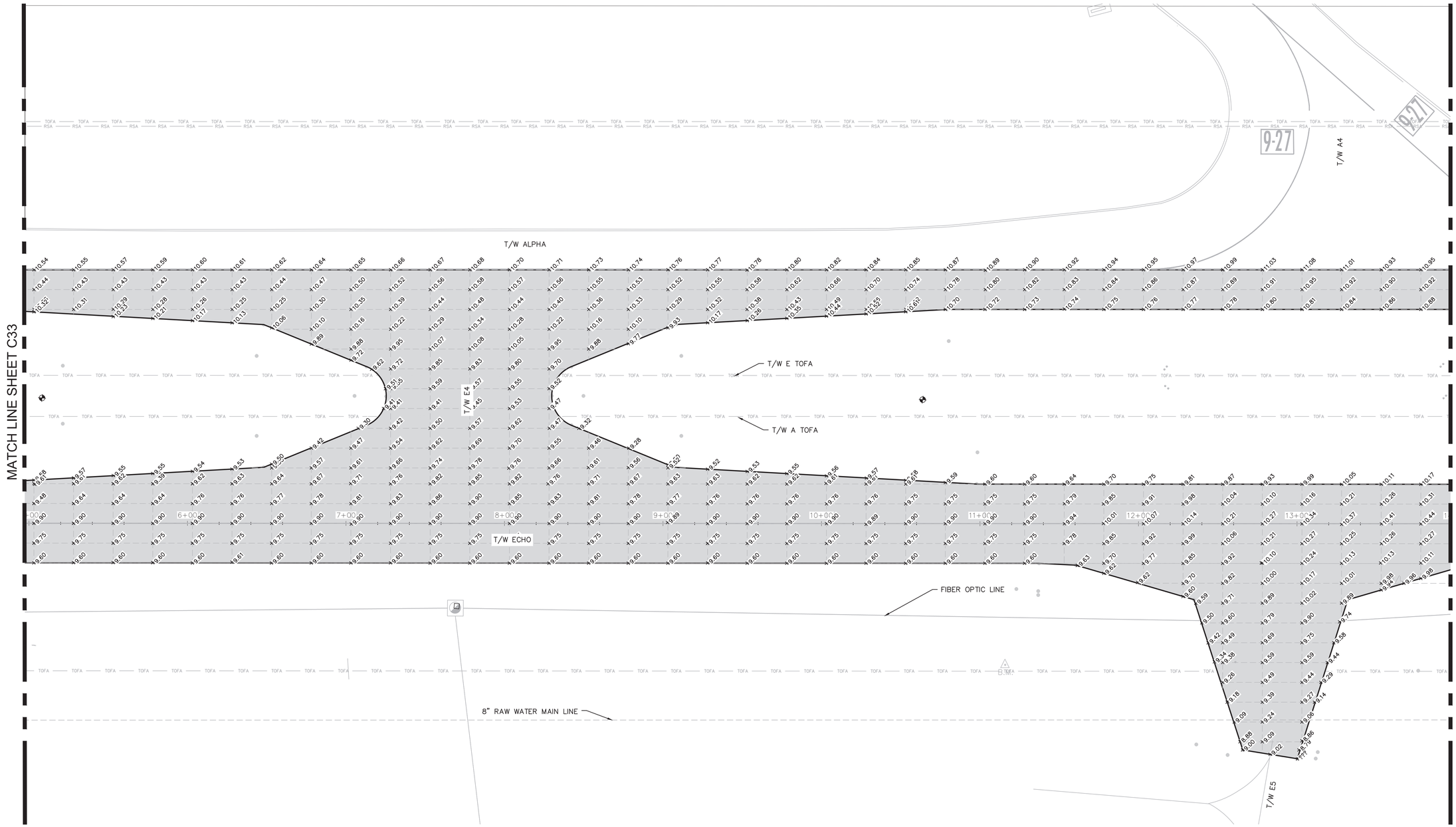

LEGEND (WORK)

CONSTRUCT NEW PAVEMENT SECTION TO GRADE

LEGEND (SYMBOL)

+11.6 SPOT ELEVATION

RSA — RUNWAY SAFETY AREA

TSA — TAXIWAY SAFETY AREA

TOFA — TAXIWAY OBJECT FREE AREA

NOTES

1. REFER TO SHEETS C25 TO C27 FOR PAVING AND GEOMETRY PLANS.
2. REFER TO SHEETS C28 TO C30 FOR GRADING PLANS.
3. REFER TO SHEET C21 TO C23 FOR DEMOLITION REQUIREMENTS
4. SEE "TYPICAL SECTIONS" SHEET NOS. C17 & C18

THE ELEVATIONS SHOWN HEREON ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88). TO CONVERT THE ELEVATIONS HEREON TO NATIONAL GEODETIC VERTICAL DATUM (NGVD29) ADD 1.51 FEET.

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FBPE No. CA 00000696
JOB NO. 044693067

HILLERS ELECTRICAL ENGINEERING, INC.
23257 STATE ROAD 7, SUITE 100
BOCA RATON, FLORIDA 33428
(561) 451-9185 PHONE
(561) 451-4886 FAX

BID SET

ENGINEER: THOMAS F. O'DONNELL
REG. No: 62478
DATE:
TEL: 561-840-0825
FAX:

DRAWN BY: MEM | DATE: 01/22/2021
DESIGNED BY: MEM | SCALE: AS NOTED
CHECKED BY: TFO | FIELD BOOK:

CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

REVISIONS

NO.	DATE	BY	CHK'D	DESCRIPTION

PROJECT # 12455
TAXIWAY INTERSECTION IMPROVEMENTS
SPOT ELEVATION PLAN (2)

SHEET NO. C34 OF 41

TOTAL: 65

CAD FILE: 12444-MULTI-ELEV

DRAWING FILE NO. 4-141-47

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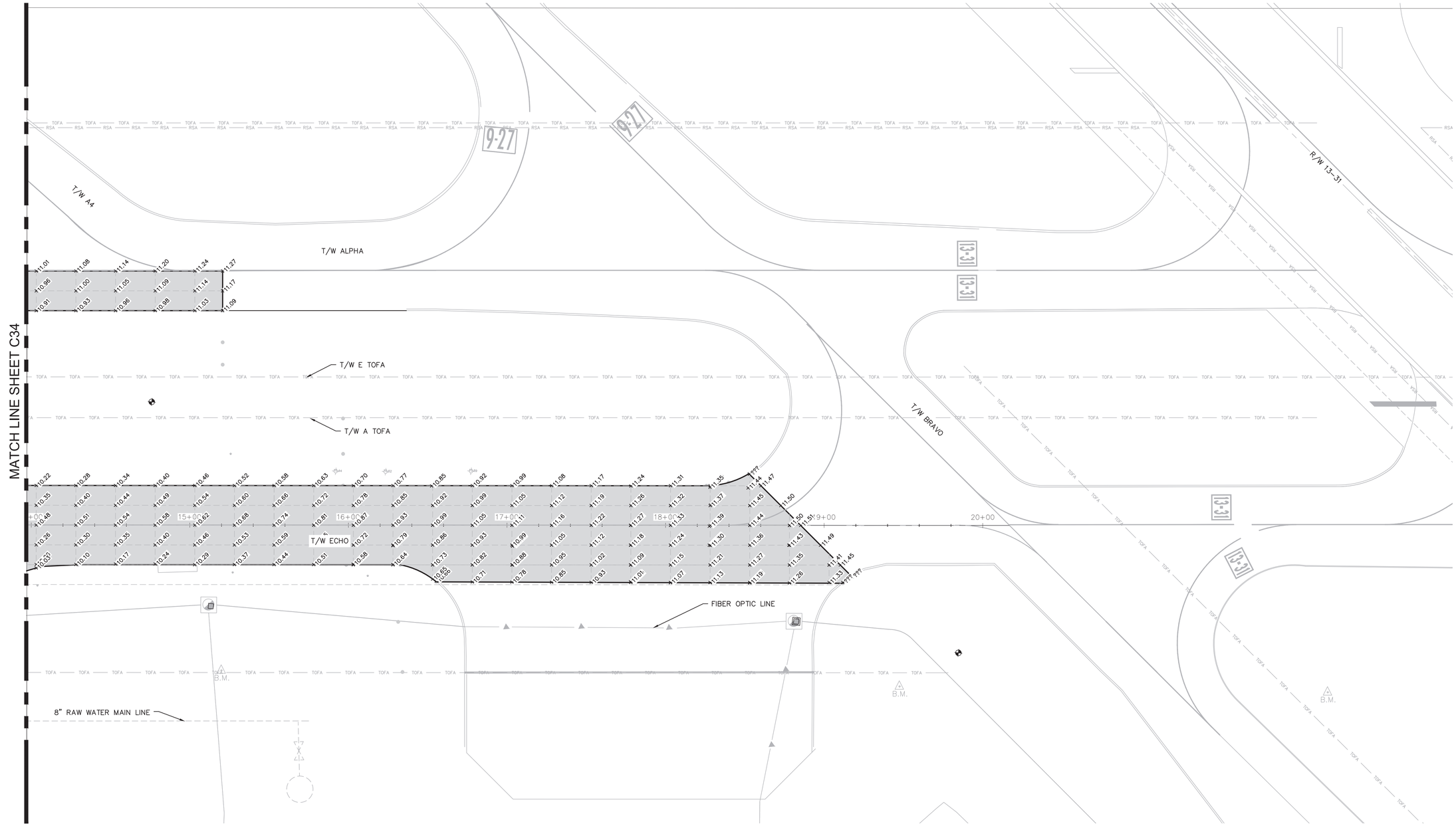

LEGEND (WORK)

CONSTRUCT NEW PAVEMENT SECTION TO GRADE

LEGEND (SYMBOL)

+11.6 SPOT ELEVATION

RSA RUNWAY SAFETY AREA

TSA TAXIWAY SAFETY AREA

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0 30' 60'

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DESIGNED BY:	CHECKED BY:	FIELD BOOK:
MEM	TFO	

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PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

REVISIONS

NO.	DATE	BY	CHK'D	DESCRIPTION

PROJECT # 12455
TAXIWAY INTERSECTION IMPROVEMENTS
SPOT ELEVATION PLAN (3)

SHEET NO.	OF
C35	41

TOTAL: 65

CAD FILE: 12444-MULTI-ELEV

DRAWING FILE NO. 4-141-47

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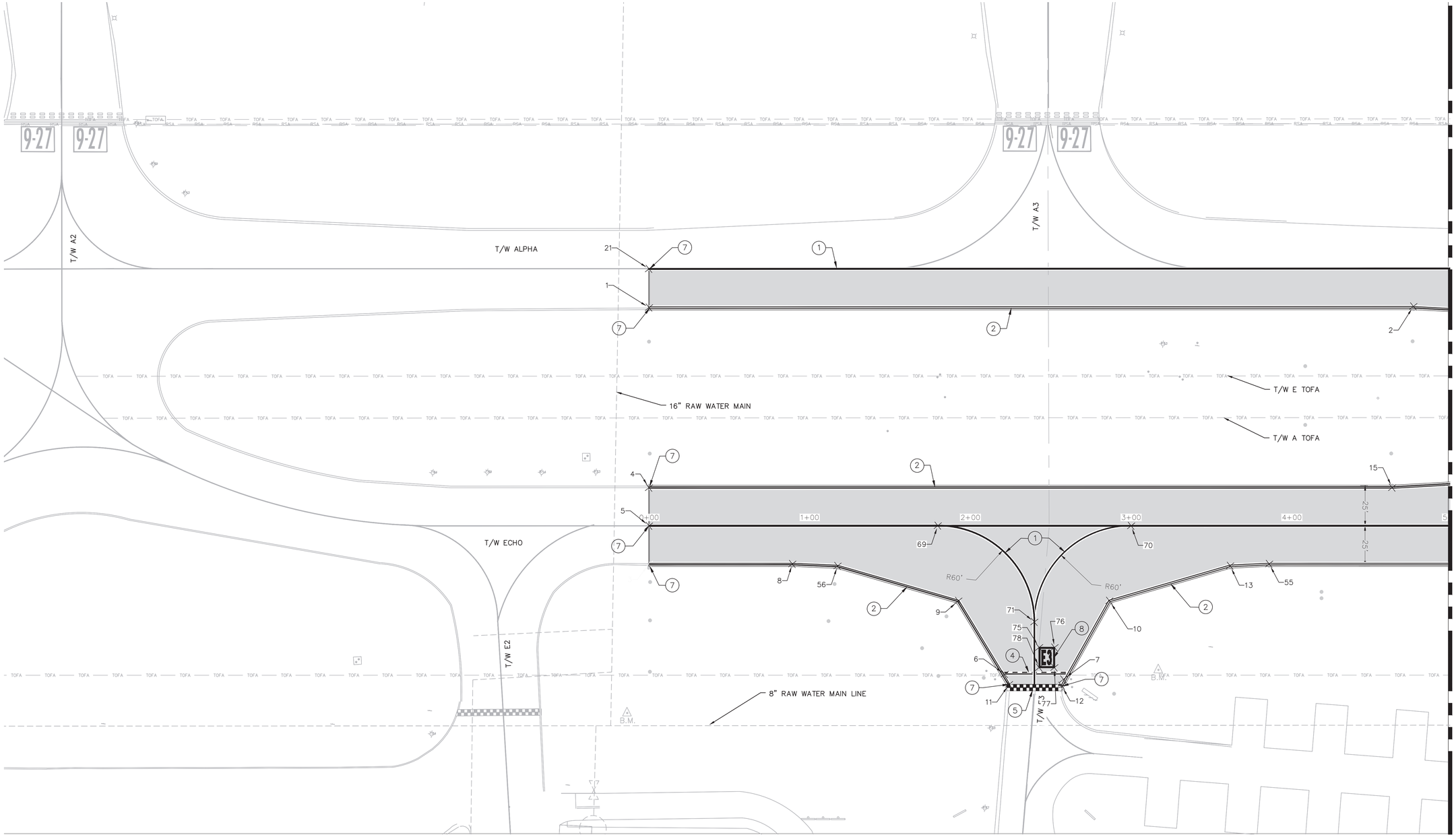

LEGEND

- LIMITS OF NEW PAVEMENT
- RSA — RUNWAY SAFETY AREA
- TSA — TAXIWAY SAFETY AREA
- (1) TAXIWAY CENTERLINE MARKING (6"). SEE DETAIL, SHEET C39
- (2) TAXIWAY EDGE MARKING, CONTINUOUS. SEE DETAIL, SHEET C39
- (3) TAXIWAY EDGE MARKING, DASHED. SEE DETAIL, SHEET C39
- (4) NON-MOVEMENT AREA BOUNDARY MARKING. SEE DETAIL, SHEET C39
- (5) ZIPPER STYLE WARNING MARKING, FOR INTERMEDIATE HOLD POSITION MARKING, SEE DETAIL SHEET C39
- (6) INTERMEDIATE HOLDING POSITION MARKING. SEE DETAIL, SHEET C39
- (7) MATCH EXISTING STRIPING
- (8) SURFACE PAINTED TAXIWAY LOCATION. SEE DETAIL SHEET C39

Pavement Markings Location		
Point	Station	Offset
1	0+00.01	-135.944'
2	4+75.64	-136.631'
3	0+00.00	23.750'
4	0+00.00	-23.750'
5	0+00.00	0.000'
6	2+21.34	92.386'
7	2+57.84	95.598'
8	0+89.17	23.750'
9	1+92.48	46.734'
10	2+86.42	46.692'
11	2+24.03	98.735'
12	2+56.75	99.585'
13	3+61.60	24.892'
14	5+42.24	24.074'
15	4+62.42	-23.750'
16	6+48.37	-34.140'
17	7+13.40	-60.744'
18	7+26.10	-80.421'
19	7+13.38	-100.086'
20	6+48.33	-126.633'
21	0+00.00	-160.005'
22	7+05.90	-160.186'
23	8+49.80	-160.442'
24	15+20.63	-160.426'
25	10+79.65	-136.406'
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27	8+41.74	-100.142'
28	8+28.53	-80.466'
29	8+41.75	-60.800'
30	9+06.80	-34.253'
31	7+77.57	-79.926'
32	6+95.57	-0.139'
33	10+97.80	-24.250'
34	8+49.32	-0.008'
35	9+84.37	23.965'
36	12+23.50	-0.174'
37	11+60.71	24.888'
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39	12+51.75	92.006'
40	12+83.52	59.809'
41	13+15.69	91.985'
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54	11+37.26	23.750'
55	3+85.87	23.750'
56	1+17.32	24.968'
69	1+79.69	-0.099'
70	3+00.00	0.000'
71	2+39.76	59.881'
72	12+65.91	138.777'
73	13+01.98	138.681'
74	16+57.24	35.684'
75	2+44.30	78.916'
76	2+53.82	79.759'
77	2+52.73	92.212'
78	2+43.19	91.368'
79	12+86.00	76.499'
80	12+95.56	76.494'
81	12+95.57	88.995'
82	12+86.00	88.999'

0 30' 60'

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BID SET

State of Florida
Professional Engineer
License No. 62478
THOMAS F. O'DONNELL

DRAWN BY:	DATE:	SCALE:
MEM	01/22/2021	AS NOTED
DESIGNED BY:	CHECKED BY:	
MEM	TFO	
FIELD BOOK:		

CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

REVISIONS			
NO.	DATE	BY	CHK'D	DESCRIPTION

PROJECT # 12455
TAXIWAY INTERSECTION IMPROVEMENTS
PAVEMENT MARKING PLAN (1)

SHEET NO.	OF
C36	41
TOTAL:	65
CAD FILE: 12444-MULTI-MARK	
DRAWING FILE NO. 4-141-47	

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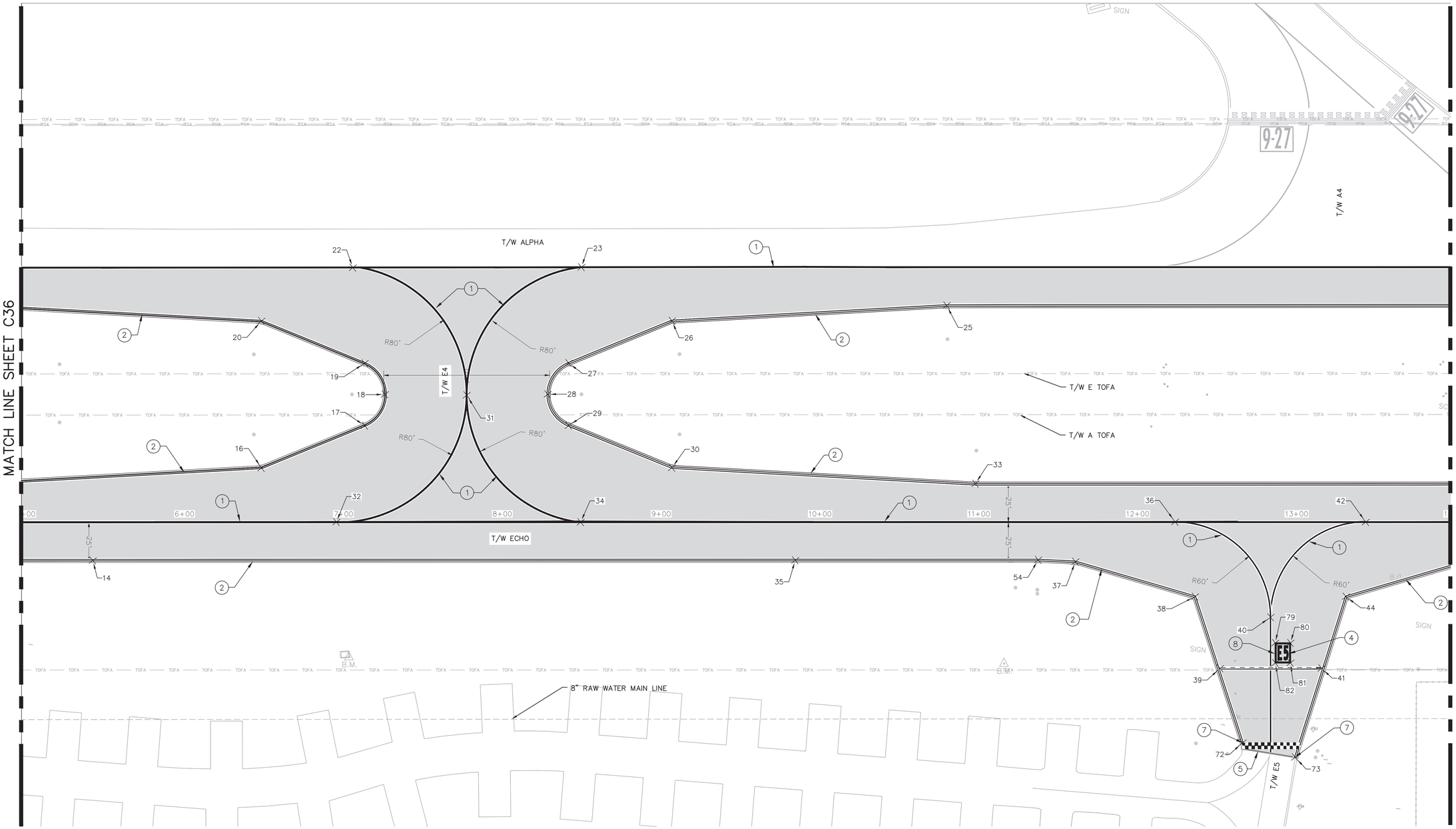

LEGEND

- LIMITS OF NEW PAVEMENT
- RSA — RUNWAY SAFETY AREA
- TSA — TAXIWAY SAFETY AREA
- (1) TAXIWAY CENTERLINE MARKING (6"). SEE DETAIL, SHEET C39
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Pavement Markings Location

Point	Station	Offset
1	0+00.01	−135.944'
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3	0+00.00	23.750'
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THOMAS F. O'DONNELL

DRAWN BY:	DATE:	SCALE:
MEM	01/22/2021	AS NOTED
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ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

REVISIONS

NO.	DATE	BY	CHK'D	DESCRIPTION

PROJECT # 12455
TAXIWAY INTERSECTION IMPROVEMENTS
PAVEMENT MARKING PLAN (2)

SHEET NO.	OF
C37	41

TOTAL: 65

CAD FILE: 12444-MULTI-MARK

DRAWING FILE NO. 4-141-47

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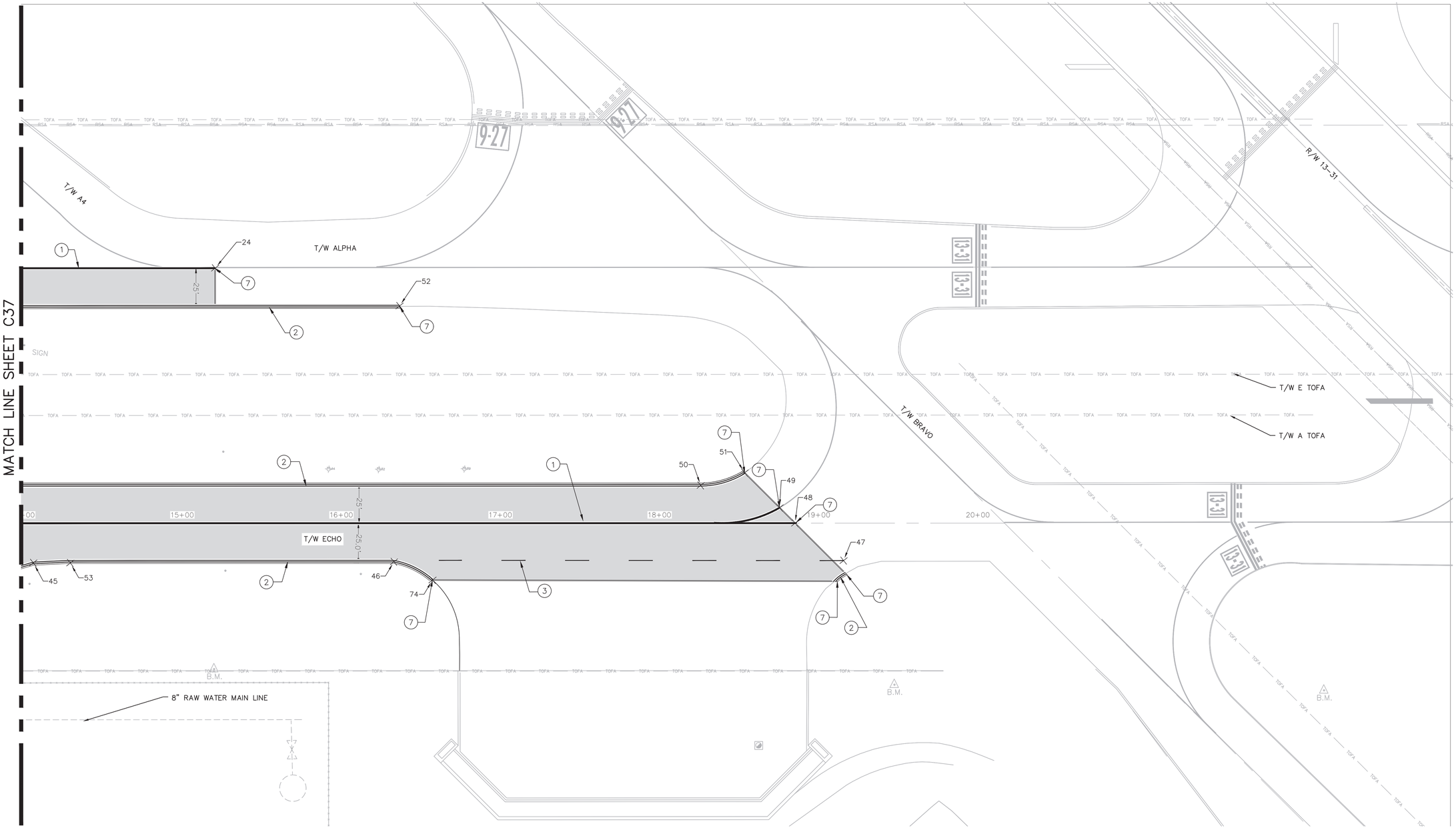

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DRAWN BY:	MEM
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DATE:	01/22/2021
SCALE:	AS NOTED
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100 North Andrews Avenue, Fort Lauderdale, Florida 33301

REVISIONS

NO.	DATE	BY	CHK'D	DESCRIPTION

PROJECT # 12455
TAXIWAY INTERSECTION IMPROVEMENTS
PAVEMENT MARKING PLAN (3)

SHEET NO.	OF
C38	41

TOTAL: 65

CAD FILE: 12444-MULTI-MARK

DRAWING FILE NO. 4-141-47

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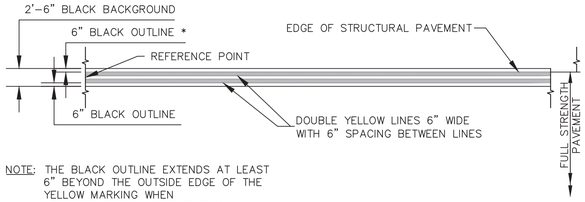
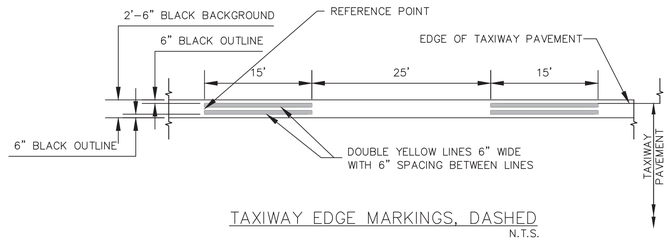
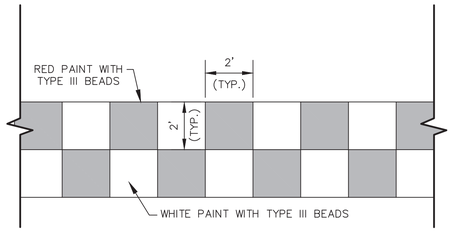


* NOTE: THE BLACK OUTLINE EXTENDS AT LEAST 6" BEYOND THE OUTSIDE EDGE OF THE YELLOW MARKING WHEN NON-STRUCTURAL PAVEMENT IS PROVIDED.

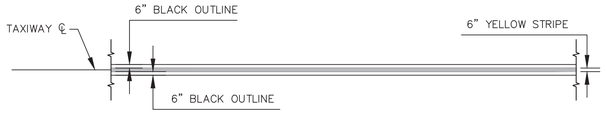
TAXIWAY EDGE MARKINGS, CONTINUOUS
N.T.S.



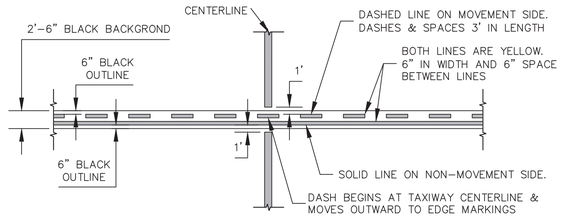
TAXIWAY EDGE MARKINGS, DASHED
N.T.S.



ZIPPER STYLE MARKING DETAIL
N.T.S.



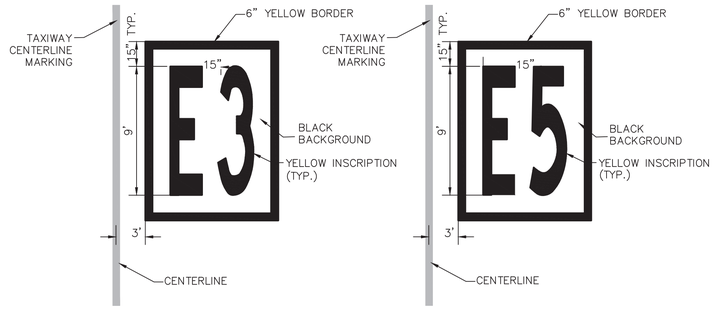
TAXIWAY CENTERLINE MARKINGS
N.T.S.



NON-MOVEMENT AREA BOUNDARY MARKINGS
N.T.S.

NOTES:

1. REFLECTORIZED (GLASS BEADS) PAINT SHALL BE USED FOR ALL PERMANENT PAVEMENT MARKINGS EXCEPT BLACK OUTLINE. SEE SPECIFICATION P-620 FOR GLASS BEAD TYPE AND APPLICATION RATE FOR EACH PAINT COLOR.
2. SEE PAVEMENT GEOMETRY PLANS, SHEETS C25 THROUGH C27 FOR HORIZONTAL LAYOUT.
3. PAVEMENT MARKING DETAILS SHALL CONFORM TO THE LATEST EDITION OF THE FEDERAL AVIATION ADMINISTRATION ADVISORY CIRCULAR 150/5340-1M; IF A CONFLICT OCCURS BETWEEN THESE PLANS AND THE CIRCULAR THE ADVISORY CIRCULAR WILL TAKE PRECEDENCE.
4. ALL TAXIWAY MARKINGS ARE YELLOW.
5. MEASURED QUANTITY PAID TO THE CONTRACTOR SHALL BE MEASUREMENT OF FINAL VISIBLE PAINT MARKINGS ACCORDING TO SPECIFICATION P-620.



SURFACE PAINTED TAXIWAY LOCATION SIGN DETAILS
N.T.S.

NOTES:
INSCRIPTION MUST CONFORM IN APPEARANCE TO THE LETTERS AND NUMBERS IN FAA ADVISORY CIRCULAR 150-5340-1M, APPENDIX B

State of Florida
Professional Engineer
License No. 62478
THOMAS F. O'DONNELL

DRAWN BY: MEM | DATE: 01/22/2021
DESIGNED BY: MEM | SCALE: AS NOTED
CHECKED BY: TFO
FIELD BOOK:

CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

REVISIONS

NO.	DATE	BY	CHK'D	DESCRIPTION

PROJECT # 12455
TAXIWAY INTERSECTION
IMPROVEMENTS
PAVEMENT MARKING DETAILS

SHEET NO. C39 OF 41
TOTAL: 65
CAD FILE: 12444-C39-DETL
DRAWING FILE NO. 4-141-47

CALL 48 HOURS BEFORE YOU DIG
IT'S THE LAW! DIAL 811
811 Know what's below. Call before you dig.
SUNSHINE STATE ONE CALL OF FLORIDA, INC.
CALL 48 HOURS BEFORE DIGGING FAA FACILITIES 954-356-7212

Kimley»Horn
Kimley-Horn and Associates, Inc.
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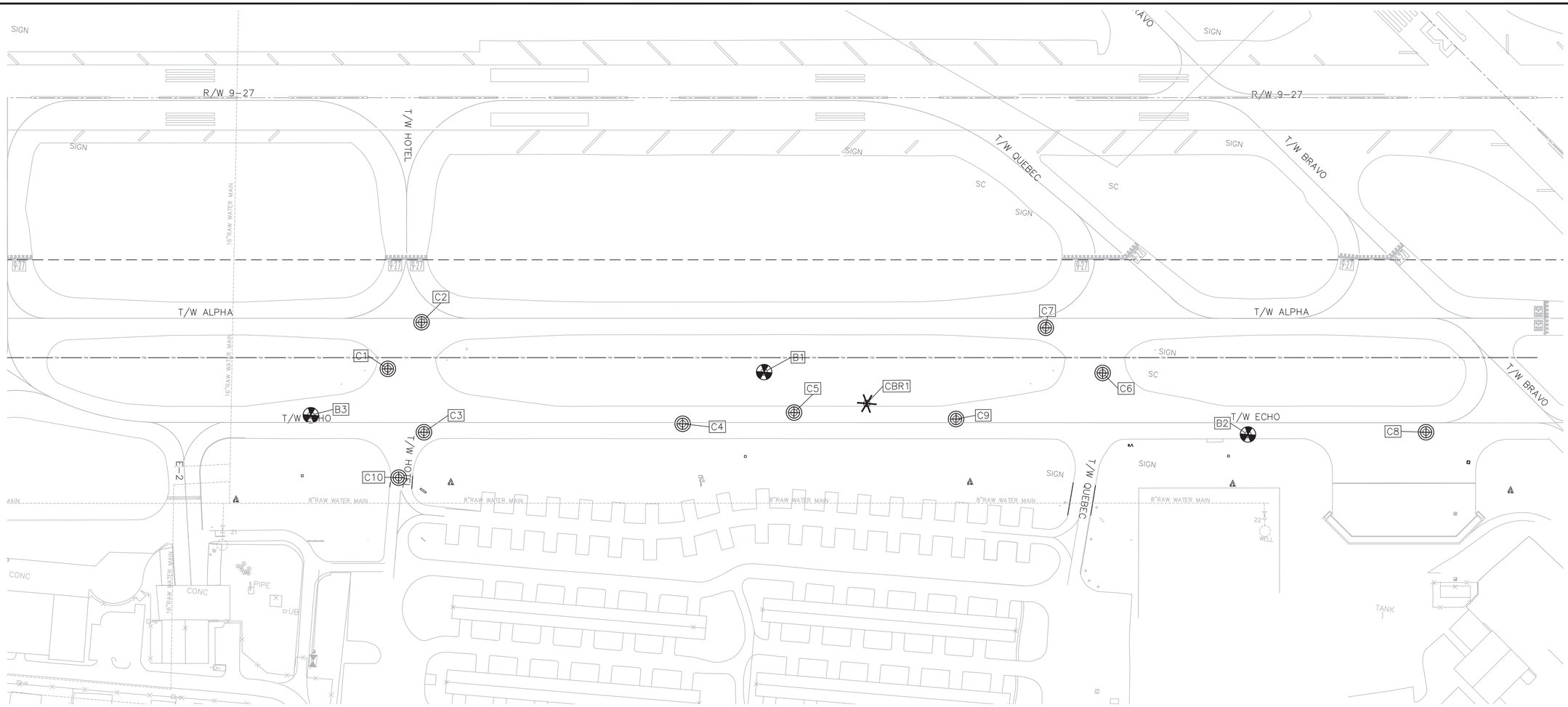
600 N. PINE ISLAND RD, SUITE 450, PLANTATION, FL 33324
FBPE No. CA 00000696
JOB NO. 044693067

HILLERS ELECTRICAL ENGINEERING, INC.
23257 STATE ROAD 7, SUITE 100
BOCA RATON, FLORIDA 33428
(561) 451-9185 PHONE
(561) 451-4886 FAX

BID SET

K:\FTL_AVIATION\044693067 - TW E H & Q IMPROVEMENTS\CADD\PLANSHEETS\12444-C39-DETL.DWG



TAXIWAY ECHO, HOTEL & QUEBEC
BORING LOCATION PLAN

BORING LOCATION TABLE		
LOCATION No.	LATITUDE	LONGITUDE
C1	26.1966	-80.1781
C6	26.1970	-80.1748
C10	26.1963	-80.1780
CBR1	26.1968	-80.1759

0 80' 160'

LEGEND

- RSA — RUNWAY SAFETY AREA
- TSA — TAXIWAY SAFETY AREA
- SPT BORING LOCATION
- CORE LOCATION
- CBR TEST LOCATION

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22257 STATE ROAD 7, SUITE 100
BOCA RATON, FLORIDA 33428
(561) 451-9165 PHONE
(561) 451-4886 FAX

BID SET

State of Florida
Professional Engineer
License No. 62478
THOMAS F. O'DONNELL

DRAWN BY:	DATE:
MEM	01/22/2021
DESIGNED BY:	SCALE:
MEM	AS NOTED
CHECKED BY:	
TFO	
FIELD BOOK:	

CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

REVISIONS			
NO.	DATE	BY	CHK'D	DESCRIPTION

PROJECT # 12455
TAXIWAY INTERSECTION IMPROVEMENTS
BORING LOCATION PLAN

SHEET NO.	OF
C40	41

TOTAL: 65

CAD FILE: 12444-C40-BORE

DRAWING FILE NO. 4-141-47

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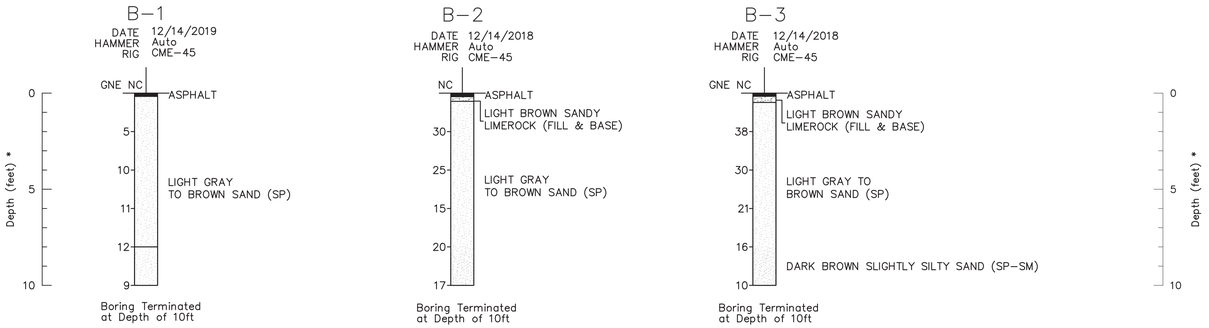

H & Q INTERSECTION
SOIL PROFILES

NOTES

▽ ENCOUNTERED GROUNDWATER TABLE

N NUMBERS TO THE LEFT OF BORINGS INDICATE SPT VALUE FOR 12" PENETRATION AND THEY WERE OBTAINED USING AN AUTOMATIC HAMMER. (UNLESS OTHERWISE NOTED.)

* DENOTES DEPTH IN FEET FROM EXISTING GROUND SURFACE

LEGEND

ASPHALT

SANDY GRAVEL

SAND

CORING/BORING PROFILES PROVIDED BY:

Tierra South Florida
2765 Vista Parkway Suite 9
West Palm Beach, Florida 33411
Phone: 561-687-8536
Fax: 561-687-8570
FL Cert. No.: 28073

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DRAWN BY:	DATE:
MEM	01/22/2021
DESIGNED BY:	SCALE:
MEM	AS NOTED
CHECKED BY:	
TFO	
FIELD BOOK:	

CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

REVISIONS

NO.	DATE	BY	CHK'D	DESCRIPTION

PROJECT # 12455
TAXIWAY INTERSECTION
IMPROVEMENTS
BORING PROFILES

SHEET NO.	OF
C41	41

TOTAL: 65

CAD FILE: 12444-C41-PROF

DRAWING FILE NO. 4-141-47

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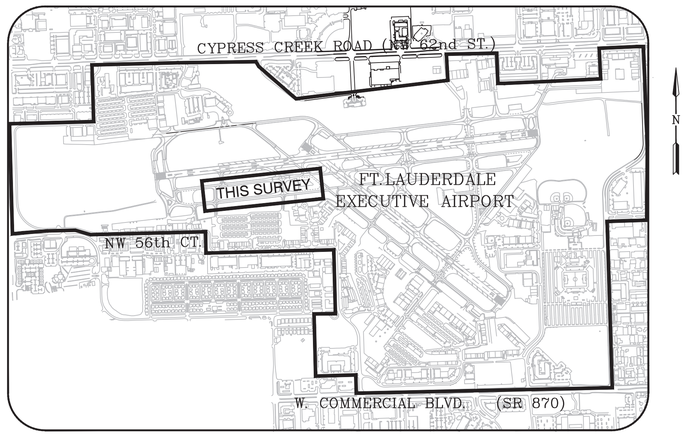

LOCATION MAP

NOT TO SCALE

SURVEY NOTES:

1. THIS SKETCH OF TOPOGRAPHIC SURVEY WAS PREPARED IN ACCORDANCE WITH THE STANDARDS OF PRACTICE FOR SURVEYING ESTABLISHED BY THE BOARD OF PROFESSIONAL SURVEYORS AND MAPPERS IN CHAPTER 5J-17, FLORIDA ADMINISTRATIVE CODES, PURSUANT TO SECTION 472.027, FLORIDA STATUTES.
2. THIS SURVEY IS NOT VALID WITHOUT THE SIGNATURE AND THE ORIGINAL RAISED SEAL OF A FLORIDA LICENSED SURVEYOR AND MAPPER.
3. THE PURPOSE OF THIS SURVEY IS TO PROVIDE TOPOGRAPHIC DATA FOR TAXIWAY INTERSECTION IMPROVEMENTS.
4. THE LIMITS OF THE SURVEY ARE: TAXIWAYS HOTEL AND QUEBEC SOUTH OF TAXIWAY ALPHA TO THE NON-MOVEMENT LINE. TAXIWAY ECHO FROM THE WESTERN TAXIWAY HOTEL FILLET TO TAXIWAY BRAVO'S AND WESTERN SAFETY AREA. TAXIWAY ALPHA AT ITS INTERSECTIONS WITH TAXIWAYS HOTEL AND QUEBEC.
5. TAXIWAY CENTER LINES, TAXIWAY OBJECT FREE AREA AND RUNWAY OBJECT FREE AREA LINES ARE PER SPECIAL PURPOSE (R/W & T/W) SURVEY, CITY PROJECT NO. 11151, FILE NO. 04-131-02, DATED JUNE 2007, PREPARED BY KIMLEY-HORN AND ASSOCIATES, FILES NO. 04715345 AND 044693021.
6. A SEARCH OF THE PUBLIC RECORDS FOR OWNERSHIP, EASEMENTS, RIGHTS-OF-WAY, OR OTHER MATTERS OF RECORD WAS NOT PERFORMED BY STONER & ASSOCIATES, INC. THERE MAY BE ADDITIONAL INFORMATION RECORDED IN THE PUBLIC RECORDS OF BROWARD COUNTY THAT IS NOT SHOWN HEREON.
7. THE BEARINGS SHOWN HEREON ARE BASED ON THE CENTERLINE 9-27 (8-26) PER FXE AIRPORT & LEASE PARCEL MAP CITY OF FORT LAUDERDALE EXECUTIVE AIRPORT PROJECT NO. 11404 BEING S.83°25'05"W.
8. THE HORIZONTAL COORDINATES SHOWN HEREON ARE BASED ON THE FLORIDA STATE PLANE COORDINATE SYSTEM (EAST ZONE), NORTH AMERICAN DATUM 1983/1990 ADJUSTMENT (N.A.D. 83/90). THE COORDINATES FOR EACH CONTROL POINT WERE ESTABLISHED BY UTILIZING A COMBINATION OF GPS OBSERVATIONS AND/OR CONVENTIONAL SURVEY MEASUREMENTS. THIS SURVEY IS RELATIVE TO SAID SPECIAL PURPOSE SURVEY, CITY PROJECT NO. 1115. THE FOLLOWING MONUMENTS WERE UTILIZED AS THE BASIS OF THE COORDINATES FOR SAID R/W & T/W SURVEY, AND ARE DESCRIBED AS FOLLOWS: 4"X4" CONCRETE MONUMENT WITH DISK STAMPED "JEREMY" FOUND AT THE NORTHWEST END OF RUNWAY 13-31 AND A PK NAIL AND DISK STAMPED "F-1 GPS CITY OF FT. LAUDERDALE" FOUND AT THE SOUTHEAST END OF RUNWAY 13-31. THE COORDINATE VALUES ARE: NORTHING: 675946.570, EASTING: 930729.861 AND NORTHING: 679299.723, EASTING: 926503.817, RESPECTIVELY, AS PROVIDED BY THE CITY OF FORT LAUDERDALE AND NOTED IN SAID SURVEY.
9. THE ELEVATIONS SHOWN HEREON ARE BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (N.A.V.D. 88) ESTABLISHED FROM CITY OF FORT LAUDERDALE BENCHMARKS: NW 965 A MAG NAIL IN BRASS DISC STAMPED CITY OF FT LAUD BM NW 965 ON SOUTH SIDE EDGE OF PAVEMENT OF NW 55 COURT, 380' +/- WEST OF CENTER LINE OF NW 23 AVENUE, ELEVATION= 8.436', AND NM 968, A MAG NAIL IN BRASS DISC STAMPED CITY OF FT LAUD BM NW 968 ON NORTHEAST SIDE EDGE OF PAVEMENT OF NW 56 STREET, 306' +/- NORTH of CENTER LINE OF NW 55 COURT, ELEVATION= 7.764'
10. THE PROPERTY SHOWN HEREON HAS THE FOLLOWING FLOOD ZONE DESIGNATION:

    a. NFIP COMMUNITY NAME & COMMUNITY NUMBER: CITY OF FORT LAUDERDALE 125105
    b. COUNTY NAME: BROWARD
    c. STATE OF FLORIDA
    d. MAP/PANEL NUMBER: 12011C / 0358
    e. SUFFIX: H
    f. FIRM INDEX DATE: AUGUST 18, 2014
    g. FIRM PANEL EFFECTIVE/REVISED DATE: AUGUST 18, 2014
    h. FLOOD ZONE: X
    i. BASE FLOOD ELEVATIONS: NOT APPLICABLE

    THE FLOOD ZONE INFORMATION SHOWN HEREON IS BASED UPON THE CURRENT PUBLISHED FLOOD INSURANCE RATE MAP (FIRM) ON THE DATE THIS SURVEY WAS PREPARED. THE DATA CONTAINED IN THE FIRM MAP IS SUBJECT TO CHANGE WITHOUT NOTICE. FOR THE LATEST FLOOD ZONE INFORMATION CONSULT THE FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) OR YOUR LOCAL GOVERNMENTAL BUILDING DEPARTMENT.
11. CERTAIN FEATURES ARE REPRESENTED BY THE SYMBOLS REFLECTED IN THIS MAP. THE LEGEND OF FEATURES MAY HAVE BEEN ENLARGED FOR CLARITY AND MAY NOT REPRESENT THE ACTUAL SHAPE OR SIZE OF THE FEATURE. THE SYMBOLS HAVE BEEN PLOTTED AT THE APPROXIMATE CENTER OF THE FEATURE BASED UPON THE FIELD LOCATION.
12. THIS SKETCH IS INTENDED TO BE DISPLAYED AT A HORIZONTAL SCALE OF 1 INCH = 40 FEET.
13. THE HORIZONTAL ACCURACY FOR WELL DEFINED IMPROVEMENTS DEPICTED ON THIS SKETCH IS ONE-TENTH (0.1' ±) OF A FOOT, PLUS OR MINUS.
14. IRRIGATION FEATURES, SUCH AS SPRINKLERS (IF ANY), ARE NOT SHOWN HEREON.
15. THE DIMENSIONS SHOWN HEREON ARE BASED UPON U.S. SURVEY FEET AND FRACTIONAL PARTS THEREOF.
16. THE SURVEYOR DID NOT INSPECT THIS PROPERTY FOR ENVIRONMENTAL HAZARDS.
17. THE INFORMATION DEPICTED ON THIS SKETCH OF SURVEY REPRESENTS THE RESULTS OF A FIELD SURVEY ON THE DATE INDICATED ON THE BORDER OF THE DRAWING AND CAN ONLY BE CONSIDERED VALID FOR THIS DATE AND INDICATES THE GENERAL CONDITIONS EXISTING AT THE TIME OF THE FIELD SURVEY.
18. THIS SKETCH OF SURVEY CANNOT BE RELIED UPON BY PERSONS OR ENTITIES OTHER THAN THOSE PERSONS OR ENTITIES CERTIFIED TO HEREON. ADDITIONS OR DELETIONS TO THIS SURVEY AND/OR REPORTS BY PEOPLE OR PERSONS OTHER THAN THE SIGNING PARTIES ARE PROHIBITED WITHOUT PRIOR WRITTEN CONSENT OF THE SIGNING PARTY OR PARTIES.
19. THE INFORMATION CONTAINED IN THIS DOCUMENT WAS PREPARED BY STONER & ASSOCIATES, INC. (S&A). S&A HAS TAKEN PRECAUTIONS TO ENSURE THE ACCURACY OF THIS DOCUMENT AND THE DATA REFLECTED HEREIN. S&A CANNOT NOT GUARANTEE THAT ALTERATIONS AND/OR MODIFICATIONS WILL NOT BE MADE TO THE DATA CONTAINED IN THIS DOCUMENT BY OTHERS AFTER IT LEAVES OUR POSSESSION. THIS DOCUMENT MUST BE COMPARED TO THE ORIGINAL HARD COPY (WHICH BEARS THE RAISED SURVEYOR'S CERTIFICATION SEAL) TO ENSURE THE ACCURACY OF THE INFORMATION CONTAINED HEREON AND TO FURTHER ENSURE THAT ALTERATIONS AND/OR MODIFICATIONS HAVE NOT BEEN MADE. S&A MAKES NO WARRANTIES, EXPRESSED OR IMPLIED, CONCERNING THE ACCURACY OF THE INFORMATION CONTAINED IN THIS OR ANY DOCUMENT TRANSMITTED OR REVIEWED BY COMPUTER OR OTHER ELECTRONIC MEANS. CONTACT S&A FOR VERIFICATION OF ACCURACY.
20. THE PROPERTY SHOWN HEREON MAY BE SUBJECT TO HEIGHT RESTRICTIONS, AVIATION EASEMENTS, RUNWAY PROTECTION ZONES, BUILDING RESTRICTION LINES OR OTHER MATTERS RELATING TO FORT LAUDERDALE EXECUTIVE AIRPORT. FOR INFORMATION RELATING TO THE ABOVE, CONTACT THE AIRPORT ENGINEER OR THE AIRPORT MANAGER.

CERTIFIED TO:

CITY OF FORT LAUDERDALE
KIMLEY-HORN

SURVEYOR'S CERTIFICATE:

THIS IS TO CERTIFY THAT THIS SKETCH OF TOPOGRAPHIC SURVEY WAS MADE UNDER MY RESPONSIBLE CHARGE AND IS ACCURATE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF. I FURTHER CERTIFY THAT THIS SKETCH MEETS THE STANDARDS OF PRACTICE, ESTABLISHED BY THE BOARD OF PROFESSIONAL SURVEYORS AND MAPPERS, CHAPTER 5J-17, FLORIDA ADMINISTRATIVE CODES, PURSUANT TO SECTION 472.027, FLORIDA STATUTES

DATE OF SIGNATURE: 1/21/21

_____
WALTER DE LA ROCHA
PROFESSIONAL SURVEYOR AND MAPPER NO. 6081
STATE OF FLORIDA
STONER AND ASSOCIATES, INC. L.B. 6633
wdelarocha@stonersurveyors.com

SURVEY PREPARED BY:

STONER & ASSOCIATES, Inc.
SURVEYORS — MAPPERS
Florida Licensed Survey and Mapping Business No. 6633
4341 S.W. 62nd AVENUE TOWN OF DAVIE, FLORIDA 33314
TEL (954) 585-0997
FAX (954) 585-3927

ENGINEER:
#Name
REG. No: #NO.
DATE: #DATE

TEL: #Tel
FAX: #Fax

DRAWN BY:	DATE:	
WDLR	12/19/18	
DESIGNED BY:	SCALE:	
N/A	1" = 40' H	
CHECKED BY:		
JDS		
FIELD BOOK:		
1001, PAGES 67-70		

CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

REVISIONS

NO.	DATE	BY	CHK'D	DESCRIPTION

PROJECT # 12455
FORT LAUDERDALE EXECUTIVE AIRPORT
TAXIWAY INTERSECTION IMPROVEMENTS
TOPOGRAPHIC SURVEY

SHEET NO.	OF
X-1	2

TOTAL: 65

CAD FILE: 12444-MULTI-TSRV

DRAWING FILE NO. 4-140-01

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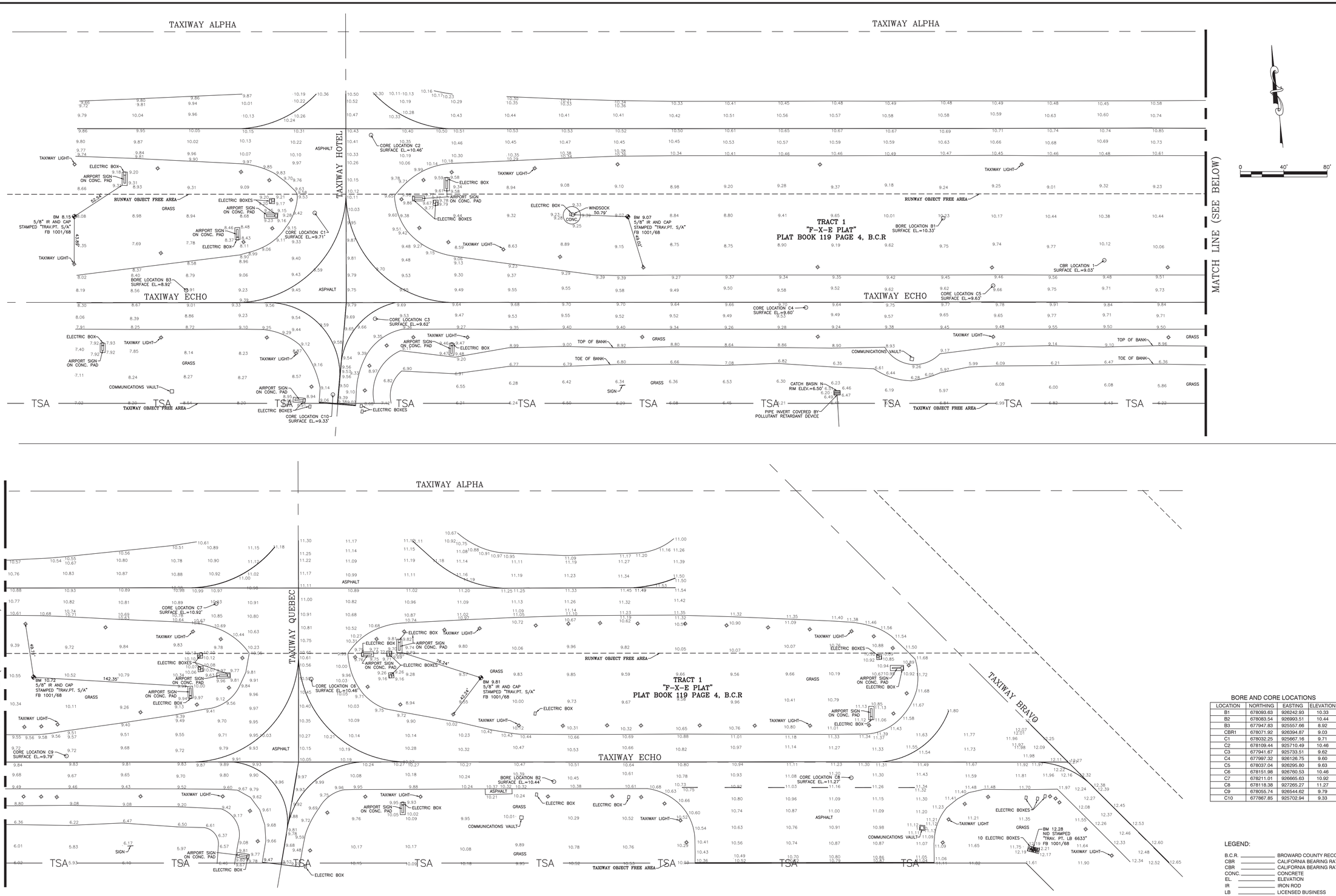

ENGINEER: #Name
REG. No: #NO.
DATE: #DATE
TEL: #Tel
FAX: #Fax

DRAWN BY: WDLR | DATE: 12/19/18
DESIGNED BY: N/A | SCALE: 1" = 40' H
CHECKED BY: JDS | FIELD BOOK: 1001, PAGES 67-70

CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

REVISIONS

NO.	DATE	BY	CHK'D	DESCRIPTION

PROJECT # 12455
FORT LAUDERDALE EXECUTIVE AIRPORT
TAXIWAY INTERSECTION IMPROVEMENTS
TOPOGRAPHIC SURVEY

BORE AND CORE LOCATIONS

LOCATION	NORTHING	EASTING	ELEVATION
B1	678093.63	926242.93	10.33
B2	678083.54	926993.51	10.44
B3	677947.83	925557.66	8.92
CBR1	678071.92	926394.87	9.03
C1	678032.25	925667.16	9.71
C2	678109.44	925710.49	10.46
C3	677941.67	925733.51	9.62
C4	677997.32	926126.75	9.60
C5	678037.04	926295.80	9.63
C6	678151.98	926760.53	10.46
C7	678211.01	926965.63	10.92
C8	678118.38	927265.27	11.27
C9	678055.74	926544.62	9.79
C10	677867.85	925702.94	9.33

LEGEND:

B.C.R.	BROWARD COUNTY RECORDS
CBR	CALIFORNIA BEARING RATIO
CBR	CALIFORNIA BEARING RATIO
CONC.	CONCRETE
EL.	ELEVATION
IR	IRON ROD
LB	LICENSED BUSINESS
N/A	NOT APPLICABLE
NID	NAIL IN DISC
S/A	STONER & ASSOCIATES, INC.
TRAV.PT.	TRAVERSE POINT

SHEET NO. X-2 | OF 2

TOTAL: 65

CAD FILE: 12444-MULTI-TSRV

DRAWING FILE NO. 4-140-01

SURVEY PREPARED BY:

STONER & ASSOCIATES, Inc.
SURVEYORS – MAPPERS
Florida Licensed Survey and Mapping Business No. 6633
4341 S.W. 62nd AVENUE TOWN OF DAVIE, FLORIDA 33314
TEL (954) 585-0997
FAX (954) 585-3927

ELEVATIONS SHOWN HEREON ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM 1988 (NAVD 1988)

2012_blueprint.png

K:_FTL_AVIATION\044693067 – TW E H & Q IMPROVEMENTS\CADD\PLANSHEETS\12444-MULTI-TSRV.DWG Thursday, January 21, 2021 3:02:56 PM

6/16/2021 10:35 AM

GENERAL NOTES

1. THE ELECTRICAL CONTRACTOR SHALL COMPLETE THE FOLLOWING ITEMS AS SHOWN ON ELECTRICAL PLAN SHEETS:

1.1. CONTRACTOR SHALL PROVIDE AND INSTALL NEW TAXIWAY EDGE LIGHTING AND SIGNAGE SYSTEMS WITHIN PROJECT LIMITS COMPLETE, IN PLACE, AS SHOWN ON DRAWINGS.

1.2. CONTRACTOR SHALL DEMOLISH AND DISPOSE OF EXISTING LIGHTING AND SIGNAGE WITHIN PROJECT LIMITS AS SHOWN ON PLANS.

2. THE CONTRACTOR SHALL PROVIDE ALL MATERIALS AND LABOR TO INSTALL THE ELECTRICAL SYSTEMS AS INDICATED ON THE DRAWINGS. ITEMS NOT SHOWN BUT OBVIOUSLY NECESSARY FOR COMPLETION OF THE WORK SHALL BE INCLUDED.

3. THE INSTALLATION SHALL BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE, ALL LATEST FEDERAL AVIATION ADMINISTRATION STANDARDS AND ADVISORIES, AND ALL PALM BEACH COUNTY BUILDING CODES.

4. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS, INSPECTIONS, AND APPROVALS.

5. THE CONTRACTOR SHALL COORDINATE THEIR WORK WITH THE ENGINEER, PALM BEACH COUNTY DEPARTMENT OF AIRPORTS, RESIDENT PROJECT REPRESENTATIVE (RPR) AND FAA.

6. THE CONTRACTOR SHALL, BEFORE SUBMITTING THEIR BID, VISIT THE SITE OF THE PROJECT AND BECOME FAMILIAR WITH THE EXISTING CONDITIONS. NO ALLOWANCE WILL BE MADE FOR EXISTING CONDITIONS OR FAILURE OF THE CONTRACTOR TO OBSERVE THEM.

7. IT IS THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE BEFORE BIDDING WITH ALL LOCAL UTILITIES INCLUDING THE POWER, TELEPHONE, FEDERAL AVIATION ADMINISTRATION, FUEL PIPE LINES, WATER AND SEWER MAINS AND TO MEET ALL OF THEIR INSTALLATION REQUIREMENTS. ALL LABOR, EQUIPMENT AND MATERIALS NECESSARY TO MEET THESE REQUIREMENTS IS TO BE INCLUDED IN THE BID. THE CONTRACTOR SHALL OBTAIN, DELIVER AND INSTALL ALL CONDUITS, PULLBOXES AND EQUIPMENT REQUIRED BY THE UTILITIES TO THEIR SPECIFICATIONS.

8. ELECTRICAL REPRESENTATIVES ARE AS FOLLOWS:
   CITY OF FORT LAUDERDALE AIRPORT – CARLTON HARRISON – 954–828–4976
   CITY OF FORT LAUDERDALE PROJECT MANAGER – KHANT MYAT – 954–828–5061
   FAA REPRESENTATIVE – 954–410–8035
   AIRPORT ELECTRICAL MAINTENANCE – FRANK CHESSER – 954–828–7491

9. GROUNDING SHALL BE INSTALLED IN ACCORDANCE WITH SPECIFICATION SECTION L–108. THE RESISTANCE OF THE COUNTERPOISE GROUNDING SYSTEM SHALL NOT EXCEED 25 OHMS. THE EARTH SHALL BE DRY FOR 48 HOURS PRIOR TO TESTING. GROUNDING AND BONDING SHALL NOT BE PAINTED.

10. AN EQUIPMENT GROUND WIRE SIZED PER NEC SHALL BE PULLED IN ALL AIRFIELD VAULT ELECTRICAL CONDUITS, POWER AND CONTROL, WHETHER OR NOT INDICATED ON DRAWINGS.

11. ALL EQUIPMENT SHALL BE NEW AND UNUSED, U.L. LISTED AND FAA APPROVED.

12. SHOP DRAWINGS SHALL BE SUBMITTED FOR THE FOLLOWING EQUIPMENT; LIGHTING FIXTURE ASSEMBLIES, SPLICE KITS, CONDUITS, CONCRETE, SEALANTS, CABLES, BASE CANS, GUIDANCE SIGNS, TRANSFORMERS, GROUNDING AND OTHERS AS INDICATED IN THE SPECIFICATIONS OR REQUESTED BY ENGINEER.

13. THE CONTRACTOR IS RESPONSIBLE TO TEST ALL SYSTEMS AND REPAIR OR REPLACE ALL DEFECTIVE WORK TO THE SATISFACTION OF THE ENGINEER, RPR AND OWNER.

14. ALL EQUIPMENT FURNISHED AND INSTALLED BY THE CONTRACTOR SHALL BE GUARANTEED AGAINST DEFECTS IN MATERIALS AND WORKMANSHIP FOR A PERIOD OF ONE YEAR FROM DATE OF ACCEPTANCE OF ENTIRE PROJECT.

15. COORDINATE ALL ELECTRICAL EQUIPMENT, LOCATIONS, AND POWER REQUIREMENTS AND VERIFY ALL OBSTRUCTIONS WITH ALL SUBCONTRACTORS AND EQUIPMENT SUPPLIERS PRIOR TO ANY INSTALLATION.

16. THE DRAWINGS ARE NOT INTENDED TO SHOW THE EXACT LOCATION OF CONDUIT RUNS. THESE ARE TO BE COORDINATED WITH OTHER TRADES SO THAT CONFLICTS ARE AVOIDED PRIOR TO INSTALLATIONS.

17. AIRFIELD CONDUCTORS SHALL BE FAA APPROVED 5KV L–824 TYPE C CABLE. AIRFIELD VAULT POWER AND CONTROL CABLES SHALL BE 600V TRAY RATED CABLE (TC). GROUND CONDUCTORS SHALL BE GREEN 600V, XHHW BELOW FINISHED GRADE AND WET LOCATIONS. COUNTERPOISE SHALL BE #6 BARE SOLID COPPER COUNTERPOISE WIRE.

18. SCHEDULE 40 PVC SHALL BE USED UNDERGROUND. ALL ABOVE GROUND CONDUITS SHALL BE RIGID GALVANIZED STEEL. MINIMUM CONDUIT SIZE SHALL BE 3/4". ALL MADRELLING SHALL BE WITNESSED BY THE RPR.

19. FLEXIBLE CONDUITS SHALL BE USED TO TERMINATE ALL MOTORS AND OTHER VIBRATING EQUIPMENT AND SHALL BE BETWEEN 18" AND 3' IN LENGTH.

20. TYPEWRITTEN PANEL SCHEDULES SHALL BE INSTALLED IN EACH PANELBOARD AND TERMINAL BLOCK SCHEDULES IN EACH CONTROL CABINET.

21. ALL REFERENCES TO A MANUFACTURER ARE GIVEN ON AN "FAA APPROVED EQUAL" BASIS.

22. ALL SPARE CONDUITS SHALL HAVE PULL STRINGS AND BE CAPPED WITH A PVC CAP.

23. ALL CIRCUITS SHALL BE IDENTIFIED IN PULL BOXES, LIGHTING FIXTURES, MANHOLES, BASE CANS, DUCT BANKS, AND PANELBOARDS. IDENTIFICATIONS SHALL MATCH PANEL SCHEDULE.

24. EXPOSED RUNS OF CONDUITS SHALL BE INSTALLED WITH RUNS PARALLEL OR PERPENDICULAR TO WALL, STRUCTURAL MEMBERS OR INTERSECTIONS OF VERTICAL PLANES AND CEILINGS, WITH RIGHT ANGLE TURNS CONSISTING OF SYMMETRICAL BENDS OR PULL BOXES AS INDICATED ON THE DRAWINGS. BENDS AND OFFSETS SHALL BE AVOIDED WHERE POSSIBLE.

25. ALL CONDUITS PENETRATING RATED FIRE WALLS OR RATED FIRE FLOORS SHALL BE U.L. APPROVED DEVICES TO MAINTAIN THE FIRE RATING OF THE FLOOR OR WALL PENETRATED.

26. BALANCE ALL LOADS AT END OF PROJECT WITH ALL LIGHTS ON.

GENERAL INSTALLATION NOTES:

1. INFORMATION PROVIDED ON THE DRAWINGS FOR EXISTING UTILITIES, CABLES, DUCTS, MANHOLES, FIXTURES, ETC. ARE APPROXIMATE AND ARE NOT INTENDED TO PROVIDE EXACT LOCATIONS, TYPE OF COMPONENT OR MANNER OF CONSTRUCTION AND SHOULD NOT BE SCALED FROM DRAWINGS. THE LOCATION OF MANHOLES, PULL BOXES, JUNCTION BOXES, ETC. ALONG WITH THE ROUTE(S) (AND IDENTIFICATION) FOR CIRCUITS SHOWN ON THE DRAWINGS SHALL BE FIELD VERIFIED PRIOR TO CONSTRUCTION. IT IS THE CONTRACTOR'S RESPONSIBILITY TO VERIFY AND SATISFY HIMSELF/HERSELF AS TO THE LOCATION OF ALL UNDERGROUND FACILITIES WITHIN THE AREA OF CONSTRUCTION. THE CONTRACTOR SHALL REQUEST TO THE RPR IN WRITING FOR ALL RECORD DRAWINGS OF THE AREA IN CONSTRUCTION. THE CONTRACTOR SHALL REVIEW ALL RECORD DRAWINGS AND BECOME FAMILIAR WITH EXISTING CONDITIONS PRIOR TO ANY CONSTRUCTION. ALL EXISTING UTILITIES, CABLES, EQUIPMENT, DEVICES DAMAGED IN THE COURSE OF THIS CONTRACT SHALL BE IMMEDIATELY REPAIRED AT THE EXPENSE OF THE CONTRACTOR TO THE SATISFACTION OF THE OWNER. WHERE ANY ITEM IS FOUND TO BE LOCATED DIFFERENTLY THAN IS SHOWN ON THE DRAWINGS, THE ACTUAL LOCATION SHALL BE IMMEDIATELY MEASURED AND RECORDED ON THE RECORD DRAWING.

2. VARIOUS DIRECT BURIED FAA CABLES PASS THROUGH THE WORK AREA. THESE CABLES SERVE FAA FACILITIES (NAVAIDS) WHICH ARE CRITICAL FOR SAFE AIRPORT OPERATION. IT IS OF THE UTMOST IMPORTANCE THAT DAMAGE TO THESE CABLES BE PREVENTED. CABLE LOCATIONS SHOWN ON THE DRAWINGS ARE BASED ON THE BEST INFORMATION AVAILABLE, BUT ARE NOT INTENDED TO BE PRECISE. THE CONTRACTOR IS SPECIFICALLY WARNED AGAINST SCALING FAA CABLE LOCATIONS FROM THE APPROXIMATE DATA SHOWN ON DRAWINGS. THE CONTRACTOR SHALL KEEP THE RPR INFORMED OF HIS/HER EXCAVATION SCHEDULE AND OPERATIONS AT LEAST FIVE WORKING DAYS IN ADVANCE. THE CONTRACTOR SHALL NOTIFY THE FAA AND OTHER UTILITY COMPANIES AND REQUEST THAT THE CABLES AND UTILITIES BE STAKED IN THE FIELD. EVEN AFTER THE CABLES AND UTILITIES ARE STAKED, THE CONTRACTOR SHALL USE ELECTRONIC DETECTION DEVICES AND CAREFULLY HAND EXCAVATE TO LOCATE CABLES AND UTILITIES. AFTER CABLES AND UTILITIES ARE LOCATED, CONTRACTOR SHALL SPECIFY EXACT LOCATIONS (STATIONING, OFFSET, ELEVATION, AND TYPE OF CABLE AND UTILITIES) AND SHALL BE ACCURATELY MEASURED AND RECORDED ON THE RECORD DRAWING. COPIES OF THIS MEASUREMENT AND RECORDING OF THE DATA SHALL BE CONSIDERED AN IMPORTANT PART OF THE CONTRACT REQUIREMENTS. WHEN ENCASING EXISTING FAA CABLES IN DUCT OR OTHERWISE EXCAVATING IN THEIR VICINITY, CONTRACTOR SHALL USE EXTREME CAUTION TO AVOID DAMAGING CABLES AND UTILITIES. ANY DAMAGE, EVEN IF APPEARING TO BE SUPERFICIAL, SHALL BE IMMEDIATELY REPORTED TO THE RPR.

3. CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING UTILITY COMPANIES AND FAA TO IDENTIFY AND LOCATE ANY UNDERGROUND UTILITIES AND/OR CABLE WITHIN THE PROJECT LIMITS. THE CONTRACTOR SHALL ASSIST THE FAA/UTILITY COMPANIES IN EFFORTS TO FIELD VERIFY UNDERGROUND SYSTEMS/UTILITIES. THE CONTRACTOR SHALL REVIEW ALL AIRFIELD UTILITIES WITH AIRFIELD MAINTENANCE BEFORE BEGINNING WORK.

4. TEMPORARY WIRING SHALL BE REQUIRED TO MAINTAIN ALL AIRFIELD LIGHT SYSTEMS INCLUDING, EDGE LIGHTING SYSTEMS, CENTERLINES LIGHTING SYSTEMS, NAVAIDS SYSTEMS, GUIDANCE SIGN SYSTEMS, RUNWAY GUARD LIGHT SYSTEMS AND ETC,. SYSTEMS TEMPORARY TAKEN OUT OF SERVICE SHALL BE RETURNED TO OPERATING CONDITION AT THE END OF EACH WORK PERIOD. CONTRACTOR SHALL PROVIDE TEMPORARY CABLES DURING CONSTRUCTION FOR TEMPORARY LIGHTS. ALL AIRFIELD SYSTEMS SHALL REMAIN IN OPERATING CONDITION FOR ALL PORTIONS OF THE AIRFIELD WHICH ARE OR COULD BE OPENED TO TRAFFIC AT THE END OF THE WORK PERIOD. OTHER LIGHTING SYSTEMS WITHIN THE WORK AREA, WHICH WILL BE TAKEN OUT OF SERVICE WHEN REQUIRED BY CONSTRUCTION SHALL BE RESTORED AT THE EARLIEST POSSIBLE DATE. IT IS NOT PERMISSIBLE TO ALLOW PORTIONS OF EXISTING SYSTEMS EXTENDING BEYOND THE WORK AREA TO BE AFFECTED. TEMPORARY WIRING SHALL BE PROVIDED TO MAINTAIN CONTINUITY OF ALL AIRFIELD LIGHTING SYSTEMS, ETC. EXTENDING BEYOND THE WORK AREA.

5. TEMPORARY CABLE SHALL BE INSTALLED IN CONDUIT AND ANCHORED AT FREQUENT INTERVALS TO PREVENT MOVING. IF TEMPORARY CABLES MUST BE INSTALLED IN AREAS SUBJECT TO VEHICULAR TRAFFIC, CABLES SHALL BE INSTALLED IN RIGID GALVANIZED STEEL CONDUIT ANCHORED AT FREQUENT INTERVALS TO PREVENT MOVING. ALL TEMPORARY CABLES SHALL BE CLEARLY LABELED AND MARKED SO AS TO BE VISIBLE FROM A DISTANCE. SOME JUMPERS MAY BE OF SIGNIFICANT LENGTH, SEE PHASING DRAWINGS FOR ADDITIONAL INFORMATION.

6. PRIOR TO WORKING ON ANY CIRCUIT, THE CONTRACTOR SHALL PROVIDE TO THE ELECTRICAL MAINTENANCE DEPARTMENT A WRITTEN LOCKOUT PROCEDURE FOR APPROVAL. THE ELECTRICAL MAINTENANCE DEPARTMENT SHALL REVIEW AND STATE FINAL LOCKOUT RULES. CONTRACTOR SHALL NOT RELY UPON DEACTIVATION OF THE CIRCUITS BY THE TOWER OR BY OTHERS. CONTRACTOR SHALL NOTIFY ELECTRICAL MAINTENANCE 48 HOURS PRIOR TO LOCKOUT/TAGOUT.

7. THERE SHALL BE NO SPLICES OF CONDUCTORS BETWEEN LIGHTS OR IN CONDUITS OR DUCTS. SPLICES SHALL BE PERMITTED IN MANHOLES, JUNCTION BOXES, LIGHT BASES, AND OTHER APPROVED LOCATIONS USING L–823 CONNECTORS. SPLICES SHALL NOT BE ALLOWED IN ABANDONED BASE CANS/JUNCTION BOXES. SPLICES SHALL BE AT A MINIMUM AND APPROVED BY THE ENGINEER IN THE HOMERUN CONDUCTORS.

8. CONTRACTOR SHALL IDENTIFY ALL CABLES IN AFFECTED MANHOLES AND BASE CANS. CONTRACTOR SHALL USE A MINIMUM OF OF 1–STAINLESS STEEL TAG PER CABLE AND 1–TAG ON EACH SIDE OF A L–823 CONNECTOR.

9. WHEN CONTRACTOR IS WORKING WITH EXISTING CONDUITS, HE/SHE SHALL REMOVE ALL ABANDONED CABLES WITHIN PROJECT LIMITS AND IDENTIFY ALL ACTIVE CIRCUITS ON RECORD DRAWINGS.

10. CONTRACTOR SHALL BE RESPONSIBLE FOR IDENTIFYING ALL CABLE ROUTING AND CIRCUIT DESIGNATIONS ON THE RECORD DRAWINGS.

11. CONTRACTOR SHALL PROVIDE AND INSTALL CONCRETE DUCT/CABLE MARKERS AS PER FAA SPECIFICATIONS. CONTRACTOR SHALL MARK THE LOCATION OF ALL NEW DUCT BANKS WITH CONCRETE DUCT MARKERS IN UNPAVED AREAS SPACED NOT MORE THAN 200' APART AND WITH PAINTED MARKINGS AT THE EDGE OF PAVED AREAS.

12. CONTRACTOR SHALL PROVIDE ALL CONNECTOR KITS, TESTING, STAINLESS TAGS, AND ALL INCIDENTALS THAT WILL ALLOW FOR QUALITY ASSURANCE OF SUCCESSFULLY DISCONNECTING AND RECONNECTING CIRCUITS.

13. ALL IDENTIFICATION OF CONTROL PANEL INSTALLATIONS, CONSTANT CURRENT REGULATORS, BREAKER LABELS, ETC. SHALL BE PERFORMED BY THE CONTRACTOR. THE CONTRACTOR SHALL RECORD ALL CALLOUT CHANGES ON THE "RECORD" DRAWINGS FOR THIS PROJECT.

14. NAMEPLATES SHALL BE PROVIDED FOR ALL ELECTRICAL EQUPMENT TO IDENTIFY FUNCTION, CIRCUIT, VOLTAGE, AND PHASE. WHERE EQUIPMENT CONTAINS FUSES, INCLUDE THE FUSE RATINGS.

15. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING ALL CABLES AND UTILITIES, THEIR DEPTHS, ETC. INCLUDING THE USE OF SOFT DIG, GROUND PENETRATING RADAR OR OTHER MEANS AVAILABLE TO ACCURATELY LOCATE ALL CABLES AND UTILITIES AND TO SURVEY AND STAKE THOSE CABLES AND UTILITIES ON RECORD DRAWINGS PRIOR TO CONSTRUCTION.

16. ALL EXISTING CONDUCTORS SHALL BE TESTED FOR INSULATION RESISTANCE PRIOR TO WORKING ON CIRCUIT, USING A 1000V MEGOHMMETER AND SHALL BE RETURNED TO SERVICE WITH MATCHING OR BETTER INSULATION RESISTANCE READINGS. ALL PROPOSED CONDUCTORS SHALL BE TESTED FOR INSULATION RESISTANCE PRIOR TO CONNECTING TO EXISTING CIRCUIT, USING A 1000V MEGOHMMETER. CIRCUITS OR NEW PORTIONS OF CIRCUITS SHALL BE AS COMPLETE AS POSSIBLE FOR TESTING. ALL TESTING SHALL BE WITNESSED BY THE RPR AND REPORT TURNED OVER TO OWNER.

17. CONNECTION OF CONDUCTORS MUST BE MADE BY USING CRIMP CONNECTORS AND CRIMPING TOOL APPROVED BY THE CONNECTOR/LUG MANUFACTURER. THE TOOL MUST PRODUCE A COMPLETE CRIMP BEFORE IT CAN BE REMOVED. THE CRIMPING TOOL USED MUST BE LISTED BY THE L–823 KIT MANUFACTURER. MAKE THE NUMBER AND TYPE OF CRIMPS PER KIT MANUFACTURER'S INSTRUCTIONS. ELECTRICIANS THAT WILL BE MAKING CONNECTOR KIT TERMINATIONS SHALL BE TRAINED AND CERTIFIED BY THE CONNECTOR KIT MANUFACTURER.

18. THE OWNER SHALL HAVE THE RIGHT TO SALVAGE MATERIALS THAT ARE TO BE REMOVED IN THE DEMOLITION PLANS. THE CONTRACTOR SHALL COORDINATE WITH THE OWNER PRIOR TO DEMOLITION AND DELIVER SALVAGE MATERIAL TO THE AIRPORT ELECTRICAL MAINTENANCE.

19. ALL BOLTS FOR LIGHT FIXTURES, SIGNS, JUNCTION CANS SHALL BE CARBON STEEL COATED COLORED ORANGE AND INSTALLED PER FAA ENGINEERING BRIEF 83 AND MANUFACTURER'S RECOMMENDATIONS.

20. ALL BOLTS FOR LIGHT FIXTURES, SIGNS AND JUNCTION CANS SHALL BE FLUOROPOLYMER METALLIC–CERAMIC COATED SAE J429 GRADE 2 CARBON STEEL BOLTS PER FAA ENGINEERING BRIEF 84 AND MEET FAA REQUIREMENTS. BOLT COATING SHALL BE ORANGE. THE BASE CAN COVER MOUNTING BOLTS SHALL EXTEND THRU THE BASE CAN MOUNTING FLANGE INTO THE BASE CAN A MINIMUM OF 0.75 INCH BEYOND MACHINED THREAD SYSTEM. THE BOLTS SHALL HAVE ENOUGH THREAD LENGTH SO THEY DO NOT SHOULDER OUT BEFORE THE COVER IS SECURELY TIGHTENED.

21. CONTRACTOR SHALL INSTALL NEW CARBON STEEL COATED BOLTS COLORED ORANGE IN ALL EXISTING LIGHT BASE CANS, SIGN CANS, JUNCTION CANS, JUNCTION CAN PLAZAS AND ETC., THAT THE CONTRACTOR UTILIZES TO INSTALL CABLE. ADDITIONALLY, THE CONTRACTOR SHALL DRILL AND TAP OUT ANY DAMAGED AND/OR MISSING BOLTS AT THESE LOCATIONS COST SHALL BE INCIDENTAL TO THE LINE ITEMS FOR INSTALLATION/INTERCEPTION.

22. CONTRACTOR TO USE LOCTITE LB8023 MARINE GRADE ANTI–SEIZE OR APPROVED EQUAL ON COUPLINGS AND ANY APPLICATION WHERE ANTI–SEIZE IS REQUIRED.

23. AFTER LEVELING, THE CONTRACTOR SHALL ADJUST THE ASYMMETRIC LENS OF EACH OPTICAL SYSTEM SO THAT THE TWO CONCENTRATED BEAMS OF LIGHT SHINE UP AND DOWN THE RUNWAY OR TAXIWAY AND ARE "TOED IN" SYMMETRICALLY TOWARD THE CENTERLINE OF RUNWAY OR TAXIWAY. FINAL ADJUSTMENT OF ASYMMETRIC LENSES SHALL BE MADE AT NIGHT AND SHALL BE TO THE SATISFACTION OF THE RPR.

24. THE FINISHED PAVEMENT SURFACE SHALL BE PROTECTED FROM FOREIGN SUBSTANCES WHICH COULD CAUSE STAINING, I.E., OIL, P–605, JOINT SEALING FILLER ETC. THE CONTRACTOR SHALL IMMEDIATELY CLEAN ALL SPILLS AND CORRECT/CLEAN ANY STAINED SURFACES AT THE CONTRACTOR'S EXPENSE.

BID SET

Kimley»Horn
Kimley-Horn and Associates, Inc.
©2021 KIMLEY-HORN AND ASSOCIATES, INC.
1920 WEKIVA WAY, SUITE 200, WEST PALM BEACH, FL 33411
FBPE No. CA 00000696
JOB NO. #########

HILLERS ELECTRICAL ENGINEERING, INC.
25257 STATE ROAD 7, SUITE 100
BOCA RATON, FLORIDA 33428
(561) 401–9185 PHONE
(561) 401–4886 FAX

State of Florida
Professional Engineer
License No. 73735
AMY L. CHAMPAGNE - BAKER

DRAWN BY: DEU | DESIGNED BY: ALC | CHECKED BY: JWK | DATE: 01/22/21 | SCALE: NONE | FIELD BOOK:

CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

REVISIONS

NO.	DATE	BY	CHK'D	DESCRIPTION

PROJECT # 12455
H & Q INTERSECTION
IMPROVEMENTS
ELECTRICAL GENERAL NOTES

SHEET NO. E01 OF 22
TOTAL: 63
CAD FILE: 12444–E01–NOTE
DRAWING FILE NO. 4–141–47

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ELECTRICAL LEGEND

SYMBOL	DESCRIPTION
	NEW L-861T(L), LED, MITL, ELEVATED T/W EDGE LIGHT MOUNTED ON A NEW L-867 BASE CAN INSTALLED IN EARTH WITH A "CORTEN" OR APPROVED EQUAL BASE PLATE WITH PROPERLY SIZED L-830 TRANSFORMER AND L-823 CONNECTORS.
	NEW L-861T(L), LED, MITL, ELEVATED T/W EDGE LIGHT MOUNTED ON A EXISTING BASE CAN WITH PROPERLY SIZED L-830 TRANSFORMER AND L-823 CONNECTORS. CONTRACTOR TO PROVIDE AND INSTALL NEW GROUND LUG, SEE DETAILS FOR ADDITIONAL INFORMATION. CONTRACTOR SHALL DRILL AND TAP THE EXISTING BOLT HOLES IN THE EXISTING L-867 CAN. VERIFY BOLT HOLE PATTERN.
	NEW DIRECT BURIED SCHEDULE 40 PVC CONDUIT INSTALLED IN EARTH, COUNTERPOISE SHALL BE INSTALLED ABOVE CONDUIT PER DETAIL. SEE PLANS FOR AMOUNT/SIZE AND LOCATION OF CONDUITS.
	NEW CONCRETE ENCASED SCHEDULE 40 PVC CONDUIT INSTALLED IN NEW FULL STRENGTH PAVEMENT, COUNTERPOISE SHALL BE INSTALLED ABOVE CONDUIT PER DETAIL. SEE PLANS FOR AMOUNT/SIZE AND LOCATION OF CONDUITS.
	NEW CONCRETE ENCASED SCHEDULE 40 PVC CONDUIT INSTALLED IN EXISTING FULL STRENGTH PAVEMENT, COUNTERPOISE SHALL BE INSTALLED ABOVE CONDUIT PER DETAIL. SEE PLANS FOR AMOUNT/SIZE AND LOCATION OF CONDUITS. CONTRACTOR SHALL REPAIR PAVEMENT ACCORDINGLY.
	NEW 3/4" X 20' MIN. GROUND ROD, EXOTHERMICALLY WELDED AND CONNECTED TO COUNTERPOISE SYSTEM AT A MAX OF 500' SPACING
2-X 1C #-1W2"	2-X - 2 INDICATES NUMBER OF CONDUCTORS, X INDICATES CIRCUIT ID 1C - 1 INDICATES NUMBER OF #6 SOLID COUNTERPOISE 1W2" - 1 INDICATES NUMBER OF CONDUITS, 2 INDICATES CONDUIT SIZE #= QUANTITY OF CONDUITS
2-X 1W2"	2-X - 2 INDICATES NUMBER OF CONDUCTORS, X INDICATES CIRCUIT ID 1W2" - 1 INDICATES NUMBER OF EXISTING CONDUITS, 2 INDICATES EXISTING CONDUIT SIZE
#	NEW AIRFIELD GUIDANCE SIGN ON NEW CONCRETE BASE # = SIGN NUMBER
	NEW L-867 16" DIA X 24" DEEP BOTTOMLESS 2 CAN JUNCTION CAN PLAZA INSTALLED IN EARTH.
	NEW L-867 16" DIA X 24" DEEP BOTTOMLESS 4 CAN JUNCTION CAN PLAZA INSTALLED IN EARTH.
	DEMOLISH OR MODIFY ITEM, SEE NOTES FOR INFORMATION
# Yx # Yx	SEE DEMOLITION AND INSTALLATION NOTES # = INDICATES THE NOTE NUMBER Yx = INDICATES THE QUANTITY OF NOTES PER LOCATION
	EXISTING ELEVATED TAXIWAY EDGE LIGHT
	EXISTING RUNWAY EDGE LIGHT
#	EXISTING AIRFIELD GUIDANCE SIGN # = SIGN NUMBER
B	EXISTING JUNCTION CAN
	EXISTING WINDCONE
	EXISTING PULLBOX
	EXISTING FPL TRANSFORMER
F	EXISTING FPL SPLICE BOX
	EXISTING L-867 JUNCTION CAN PLAZA.
	EXISTING CONDUIT SYSTEM
— AFL —	EXISTING AIRFIELD LIGHTING DUCTBANK
— FAA —	EXISTING FAA CABLE/CONDUIT
— FPL —	EXISTING FPL CABLE/CONDUIT
— FOC —	EXISTING COMMUNICATIONS CONDUIT/DUCTBANK

CIRCUIT ID:	TYPE OF CABLE	CABLE ID COLOR
A = TAXIWAY ALPHA CIRCUIT	#8, L-824, 5KV CABLE	YELLOW
EW = TAXIWAY ECHO WEST CIRCUIT	#8, L-824, 5KV CABLE	GREEN

NOTE: PROVIDE AND INSTALL COLORED PHASE TAPE (3M ELECTRICAL VINYL) ON CABLES LOCATED IN EACH BASE CAN/ JUNCTION CAN/ MANHOLE. COLOR SHALL BE AS NOTED IN THE SCHEDULE ABOVE (CABLE ID COLOR). PROVIDE 1/2" WIDE TAPE WITH A MINIMUM OF 4 LAPS. THERE SHALL BE A MINIMUM OF ONE COLORED ID TAPE PER CABLE WHEN NO CONNECTOR KITS ARE PRESENT. WHEN CONNECTOR KITS ARE PRESENT, THERE SHALL BE ONE COLORED ID TAPE ON EACH CABLE END.

Junction Can Identification with Future Circuit ID

JCP ID	1	2	3	4
JCP-35	EW	SP		
JCP-36	EW	SP		
JCP-37	EW	A	SP	SP
JCP-38	EW	A	SP	SP
JCP-39	EW	SP		
JCP-40	EW	SP		
SP = SPARE CODUIT				

DEMOLITION NOTES

1. CONTRACTOR SHALL REMOVE THE EXISTING TAXIWAY LIGHT BASE CAN/JUNCTION CAN, DISCONNECT THE EXISTING CIRCUITS AND REMOVE CONDUCTORS BACK TO THE LAST UNAFFECTED LOCATION. REMOVE AND DISPOSE OF THE EXISTING CONDUCTORS, TRANSFORMERS, BASE CAN AND FIXTURE. BACKFILL AND RESTORE SOD ACCORDINGLY. PROVIDE, MAINTAIN AND INSTALL TEMPORARY CONDUITS AND CONDUCTOR SYSTEMS TO MAINTAIN CIRCUITS BEYOND WORK AREA IN OPERATIONAL CONDITION AT ALL TIMES DURING CONSTRUCTION. SEE PHASING PLANS FOR SEQUENCING OF WORK. THE LINE ITEM COST SHALL INCLUDE DEWATERING EXISTING CONDUITS, DUCTBANKS, BASE CANS AND MANHOLES.
2. CONTRACTOR SHALL DISCONNECT THE EXISTING CIRCUIT CONDUCTORS AND REMOVE BACK TO THE LAST UNAFFECTED MANHOLES/ JUNCTION CANS AND REMOVE EXISTING 2 CAN JUNCTION CAN PLAZA, COMPLETE. BACKFILL AND RESTORE SOD ACCORDINGLY. PROVIDE, MAINTAIN AND INSTALL TEMPORARY CONDUITS AND CONDUCTOR SYSTEMS TO MAINTAIN CIRCUITS BEYOND WORK AREA IN OPERATIONAL CONDITION AT ALL TIMES DURING CONSTRUCTION. COORDINATE WITH PHASING PLANS FOR SEQUENCING OF WORK. THE LINE ITEM COST SHALL INCLUDE DEWATERING EXISTING CONDUITS, DUCTBANKS, BASE CANS AND MANHOLES.
3. CONTRACTOR SHALL DISCONNECT THE EXISTING AIRFIELD GUIDANCE SIGN FROM THE LIGHTING CIRCUIT, AND PULL BACK THE EXISTING CONDUCTORS TO THE EXISTING LIGHT FIXTURE/JUNCTION CAN/MANHOLE AND RECONNECT THE EXISTING EDGE LIGHT CONDUCTORS TO REMOVE THE SIGN FROM THE CIRCUIT. REMOVE AND DISPOSE OF THE EXISTING SIGN, CONCRETE BASE, TRANSFORMER, CONDUITS AND CABLES. BACKFILL AND RESTORE SOD ACCORDINGLY. PROVIDE, MAINTAIN AND INSTALL TEMPORARY CONDUITS AND CONDUCTOR SYSTEMS TO MAINTAIN CIRCUITS BEYOND WORK AREA IN OPERATIONAL CONDITION AT ALL TIMES DURING CONSTRUCTION. COORDINATE WITH PHASING PLANS FOR SEQUENCING OF WORK. THE LINE ITEM COST SHALL INCLUDE DEWATERING EXISTING CONDUITS, DUCTBANKS, BASE CANS AND MANHOLES.
4. CONTRACTOR SHALL HAND EXCAVATE, LOCATE AND EXPOSE THE EXISTING DIRECT BURIED 1W2" DUCTBANK. PROTECT THE EXISTING DIRECT BURIED CONDUIT DURING CONSTRUCTION AND ENCASE THE EXISTING CONDUIT IN CONCRETE IN LOCATION SHOWN AND BACKFILL ACCORDINGLY. PROVIDE A MINIMUM OF 3" CONCRETE ENCASEMENT AROUND EXISTING CONDUITS IN A WORKMANSHIP MANNER. SEE PHASING PLANS FOR SEQUENCING OF WORK. THE LINE ITEM COST SHALL INCLUDE DEWATERING EXISTING CONDUITS, DUCTBANKS, BASE CANS AND MANHOLES.
5. CONTRACTOR SHALL REMOVE THE EXISTING EDGE LIGHT, DISCONNECT THE EXISTING CIRCUITS AND REMOVE CONDUCTORS BACK TO THE LAST UNAFFECTED LOCATION. REMOVE AND DISPOSE OF THE EXISTING CONDUCTORS, TRANSFORMERS AND DELIVER EXISTING FIXTURE TO OWNER. EXISTING BASE CAN TO REMAIN. CONTRACTOR SHALL PROVIDE AND INSTALL A TEMPORARY COVER DURING CONSTRUCTION. PROVIDE, MAINTAIN AND INSTALL TEMPORARY CONDUITS AND CONDUCTOR SYSTEMS TO MAINTAIN CIRCUITS BEYOND WORK AREA IN OPERATIONAL CONDITION AT ALL TIMES DURING CONSTRUCTION. THE LINE ITEM COST SHALL INCLUDE DEWATERING EXISTING CONDUITS, DUCTBANKS, BASE CANS AND MANHOLES.

INSTALLATION NOTES:

1. CONTRACTOR SHALL HAND EXCAVATE, LOCATE, INTERCEPT AND EXTEND EXISTING CONDUIT SYSTEM TO NEW LIGHT BASE/JUNCTION CAN/SIGN. CLEAN OUT AND DEWATER THE EXISTING CONDUIT SYSTEM. CONTRACTOR SHALL INCLUDE DEWATERING IN THE LINE ITEM COST FOR THE INTERCEPTION OF THE CONDUIT SYSTEM.
2. CONTRACTOR SHALL HAND EXCAVATE, CORE DRILL THE EXISTING JUNCTION CAN/BASE CAN AND PROVIDE AND INSTALL NEW CONDUIT AND CONDUCTOR SYSTEM, COMPLETE. SEAL, PATCH AND REPAIR JUNCTION CAN/BASE CAN, BACKFILL AND SOD ACCORDINGLY AND MAKE ALL NECESSARY CONNECTIONS FOR A COMPLETE WORKING SYSTEM IN PLACE.
3. CONTRACTOR SHALL IDENTIFY AND INTERCEPT THE EXISTING CIRCUIT CONDUCTORS IN THE EXISTING BASE CAN/MANHOLE/JUNCTION CAN AND PROVIDE AND INSTALL NEW SPLICE KITS AND EXTEND THE NEW CIRCUIT CONDUCTORS ACCORDINGLY. MAKE ALL NECESSARY CONNECTIONS FOR A COMPLETE WORKING SYSTEM IN PLACE.

State of Florida
Professional Engineer
License No. 73735
AMY L. CHAMPAGNE - BAKER

DRAWN BY: DEU
DESIGNED BY: ALC
CHECKED BY: JWK
DATE: 01/22/21
SCALE: AS NOTED
FIELD BOOK:

CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

REVISIONS

NO.	DATE	BY	DESCRIPTION

PROJECT # 12455
H & Q INTERSECTION
IMPROVEMENTS
ELECTRICAL LEGEND AND NOTES

BID SET

Kimley»Horn
Kimley-Horn and Associates, Inc.
©2021 KIMLEY-HORN AND ASSOCIATES, INC.
1920 WIDVA WAY, SUITE 200, WEST PALM BEACH, FL 33411
FBPE No. CA 00000696
JOB NO. #########

HILLERS ELECTRICAL ENGINEERING, INC.
23287 STATE ROAD 7, SUITE 100
BOCA RATON, FLORIDA 33428
(561) 451-8165 PHONE
(561) 451-4886 FAX

SHEET NO. E02 OF 22

TOTAL: 63

CAD FILE: 12444-E02-LEGD

DRAWING FILE NO. 4-141-47

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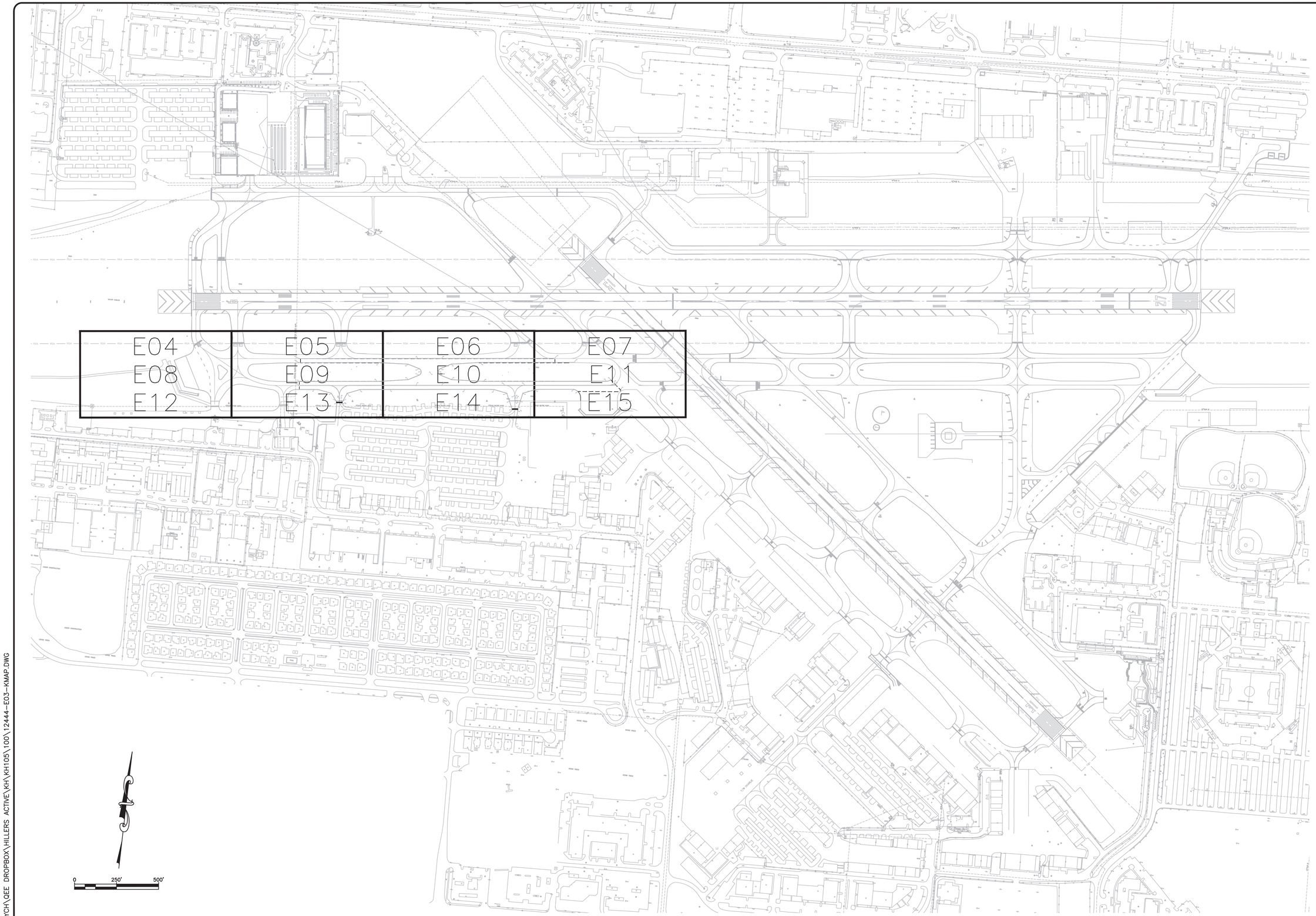

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Kimley»Horn
Kimley-Horn and Associates, Inc.

1920 WOOVA WAY, SUITE 200, WEST PALM BEACH, FL 33411
FIRM No. CA 00000696
044593065

HILLERS ELECTRICAL ENGINEERING, INC.
25257 STATE ROAD 7, SUITE 100
BOCA RATON, FLORIDA 334428
(561) 451-9185 PHONE
(561) 451-4886 FAX

State of Florida
Professional Engineer
License No. 73735
AMY L. CHAMPAGNE - BAKER

DRAWN BY: DEU	DATE: 01/22/21
DESIGNED BY: ALC	SCALE: 1" = 250'
CHECKED BY: JWK	FIELD BOOK:

CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

REVISIONS

NO.	DATE	BY	CHK'D	DESCRIPTION

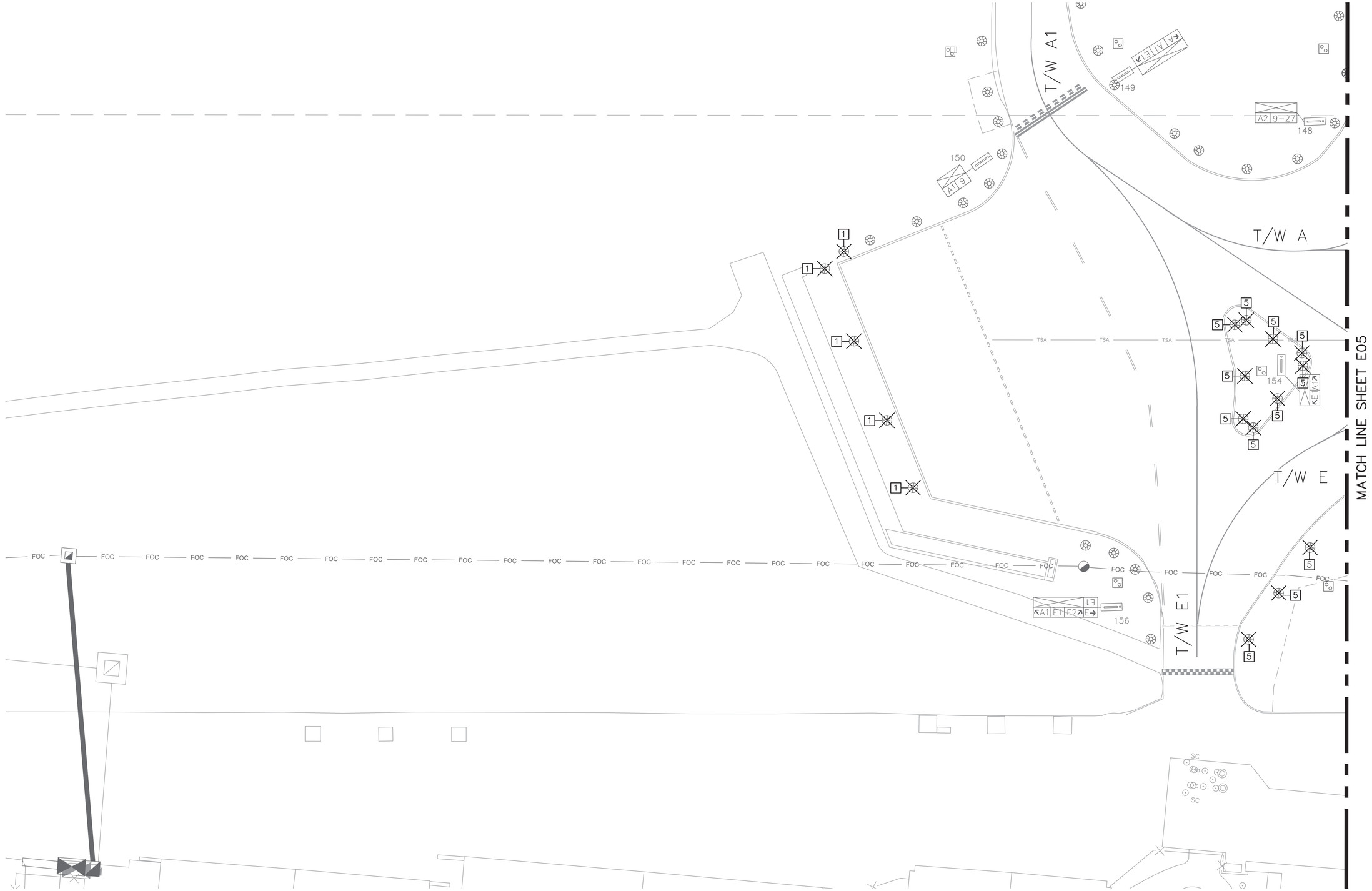
PROJECT # 12455
H & Q INTERSECTION
IMPROVEMENTS
ELECTRICAL KEY MAP

SHEET NO.	OF
E03	22

TOTAL: 63

CAD FILE: 12444-E03-KMAP

DRAWING FILE NO. 4-141-47



LEGEND (WORK)

- ASPHALT PAVEMENT REMOVAL.
- CLEARING AND GRUBBING.
- MILLING AND OVERLAYING

0 30' 60'

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23257 STATE ROAD 7, SUITE 100
BOCA RATON, FLORIDA 33428
(561) 451-9165 PHONE
(561) 451-4886 FAX

BID SET

State of Florida
Professional Engineer
License No. 73735
AMY L. CHAMPAGNE - BAKER

DRAWN BY:	DATE:	01/22/21
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ALC		
CHECKED BY:	FIELD BOOK:	
JWK		

CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

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NO.	DATE	BY	CHK'D	DESCRIPTION

PROJECT # 12455
H & Q INTERSECTION IMPROVEMENTS
ELECTRICAL DEMOLITION PLAN SHEET 1

SHEET NO.	OF
E04	22

TOTAL: 63

CAD FILE: 12444-MULTI-ELC1

DRAWING FILE NO. 4-141-47

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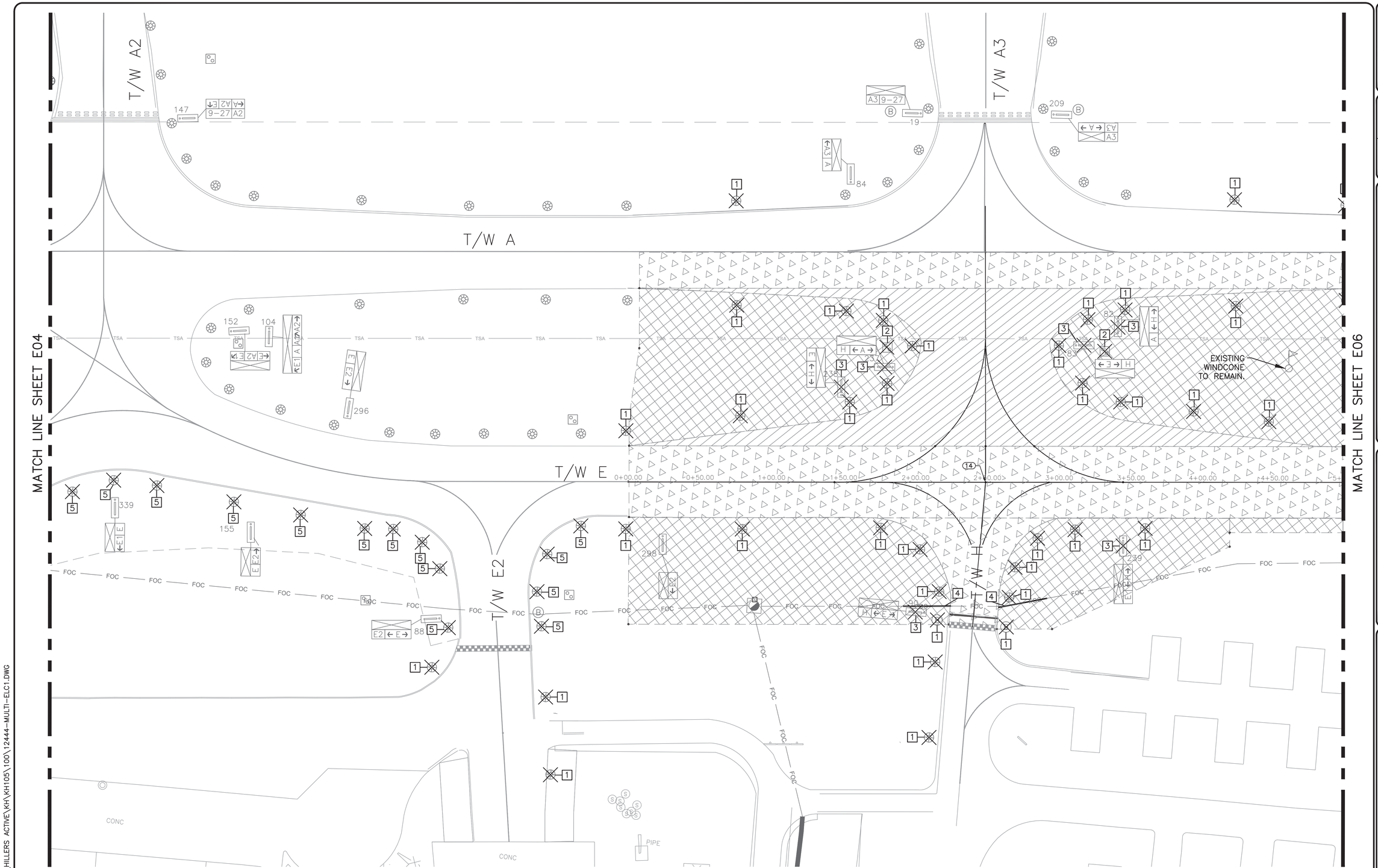

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23257 STATE ROAD 7, SUITE 100
BOCA RATON, FLORIDA 33428
(561) 451-9185 PHONE
(561) 451-4886 FAX

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License No. 73735
AMY L. CHAMPAGNE - BAKER

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REVISIONS			
NO.	DATE	BY	CHK'D	DESCRIPTION

PROJECT # 12455
H & Q INTERSECTION IMPROVEMENTS
ELECTRICAL DEMOLITION PLAN SHEET 2

SHEET NO.	OF
E05	22
TOTAL:	63
CAD FILE: 12444–MULTI–ELC1	
DRAWING FILE NO. 4–141–47	

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23257 STATE ROAD 7, SUITE 100
BOCA RATON, FLORIDA 33428
(561) 451-9165 PHONE
(561) 451-4886 FAX

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NO.	DATE	BY	CHK'D	DESCRIPTION

PROJECT # 12455
H & Q INTERSECTION IMPROVEMENTS
ELECTRICAL DEMOLITION PLAN SHEET 3

SHEET NO.	OF
E06	22

TOTAL: 63

CAD FILE: 12444-MULTI-ELC1

DRAWING FILE NO. 4-141-47

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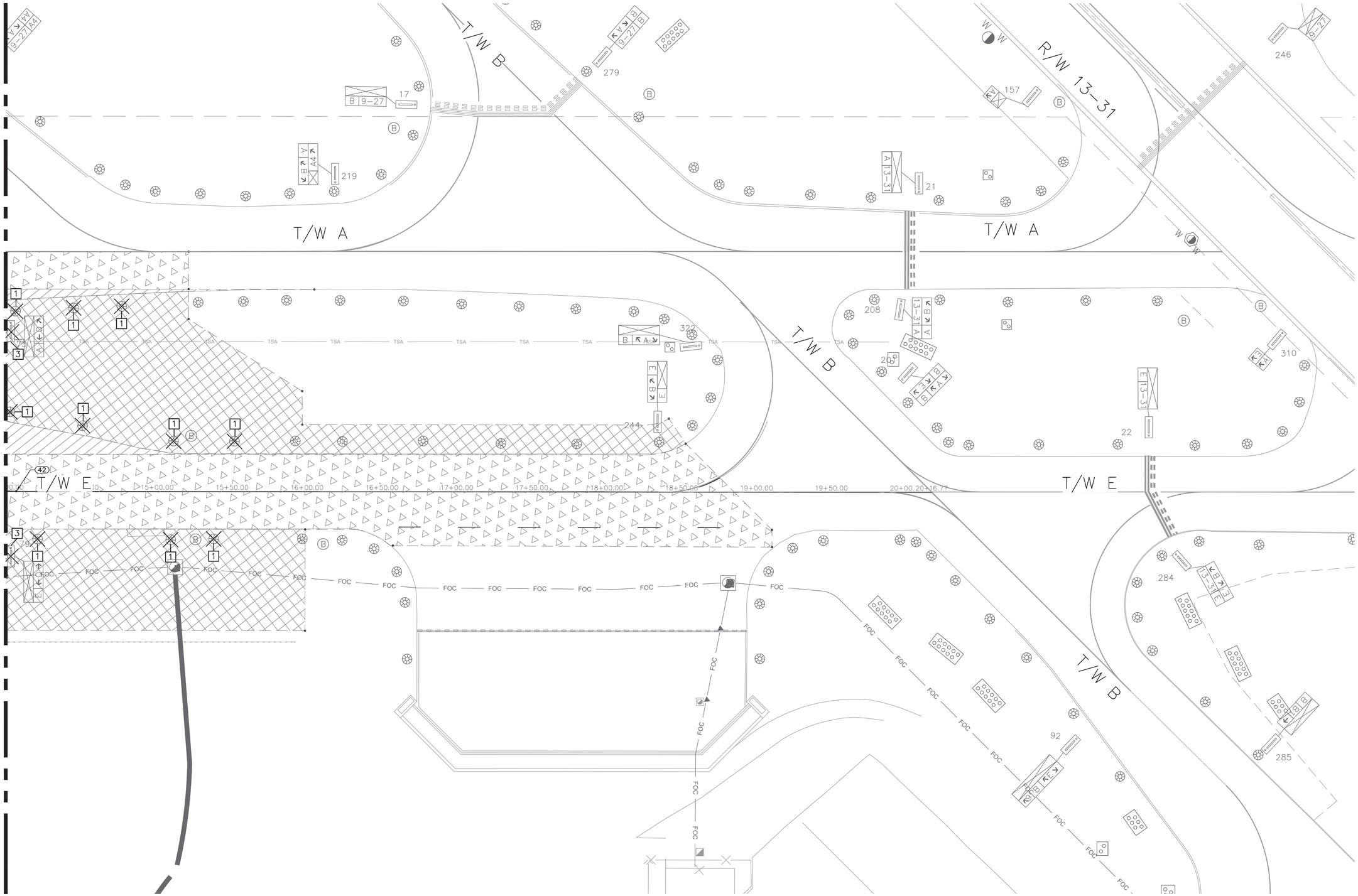

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23257 STATE ROAD 7, SUITE 100
BOCA RATON, FLORIDA 33428
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NO.	DATE	BY	CHK'D	DESCRIPTION

PROJECT # 12455
H & Q INTERSECTION IMPROVEMENTS
ELECTRICAL DEMOLITION PLAN SHEET 4

SHEET NO.	OF
E07	22
TOTAL:	63
CAD FILE: 12444-MULTI-ELC1	
DRAWING FILE NO. 4-141-47	

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NOTES:

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BOCA RATON, FLORIDA 33428
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State of Florida
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NO.	DATE	BY	CHK'D	DESCRIPTION

PROJECT # 12455
H & Q INTERSECTION IMPROVEMENTS
ELECTRICAL LAYOUT SITE PLAN SHEET 1

SHEET NO.	OF
E08	22
TOTAL:	63
CAD FILE: 12444-MULTI-ELC2	
DRAWING FILE NO. 4-141-47	

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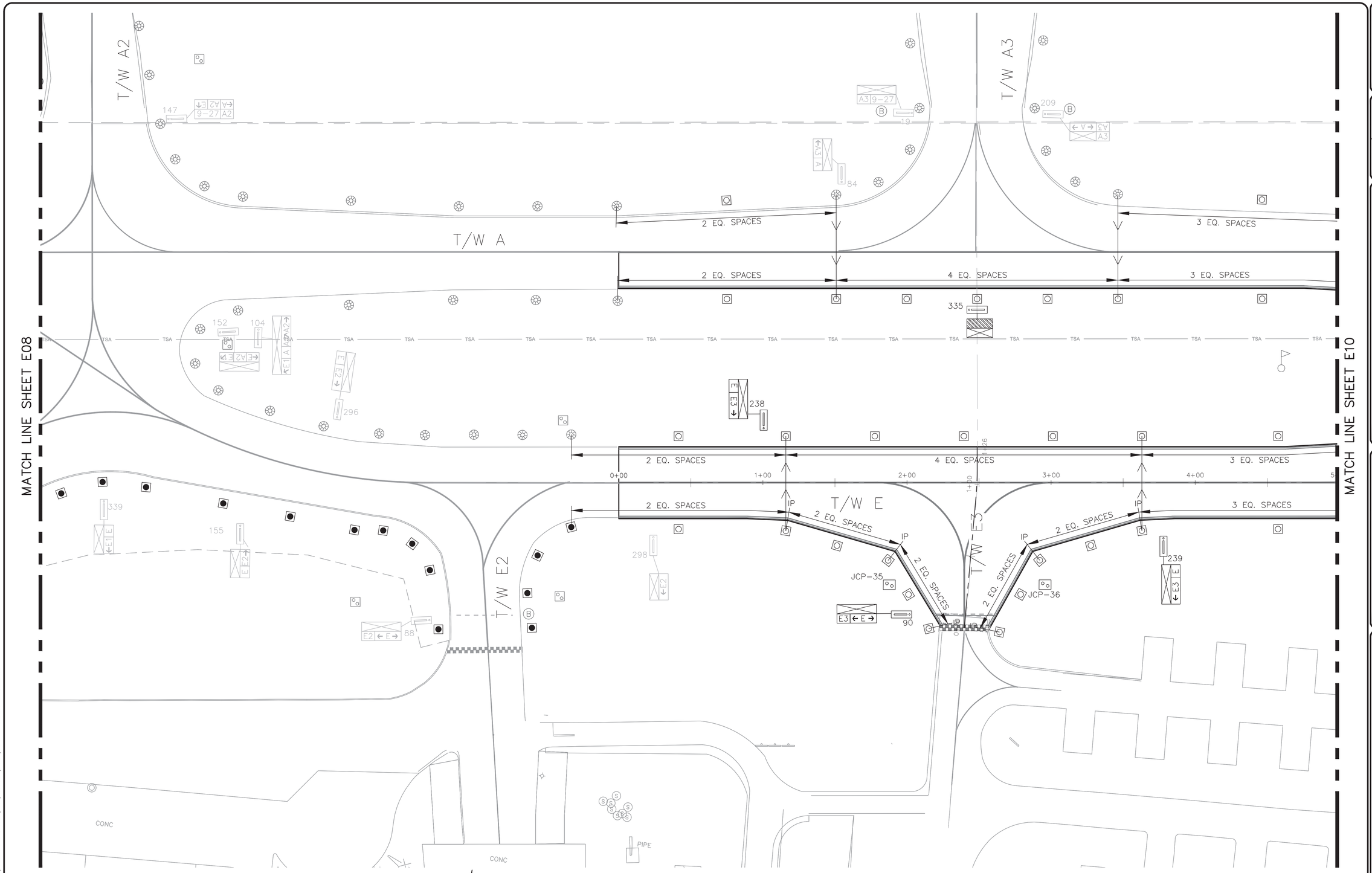

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(561) 451-9165 PHONE
(561) 451-4886 FAX

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State of Florida
Professional Engineer
License No. 73735
AMY L. CHAMPAGNE - BAKER

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ALC		
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NO.	DATE	BY	CHK'D	DESCRIPTION

PROJECT # 12455
H & Q INTERSECTION
IMPROVEMENTS
ELECTRICAL LAYOUT SITE PLAN SHEET 2

SHEET NO.	OF
E09	22

TOTAL: 63

CAD FILE: 12444-MULTI-ELC2

DRAWING FILE NO. 1-141-47

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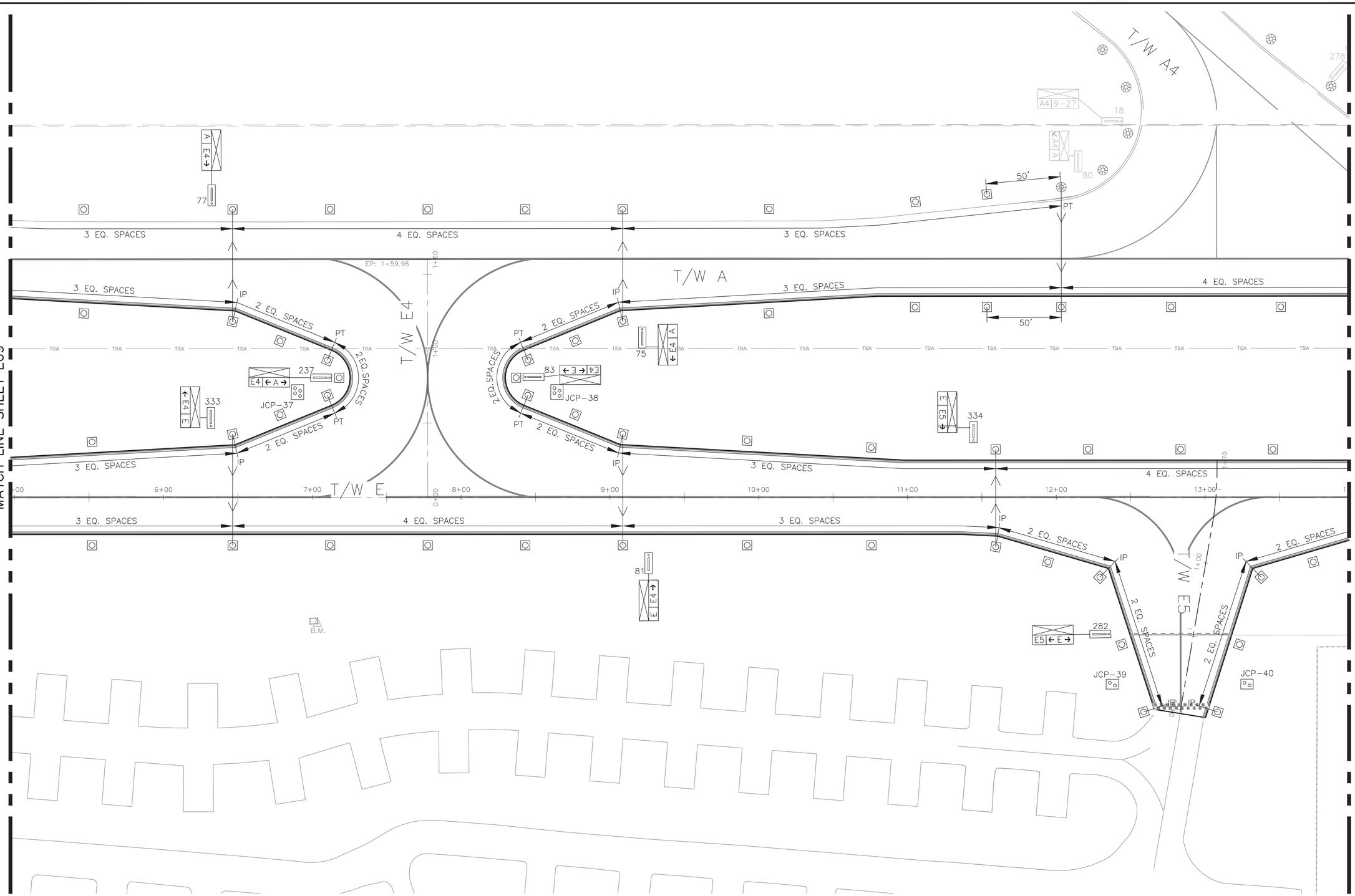

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BOCA RATON, FLORIDA 33428
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(561) 451-4886 FAX

BID SET

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		JWK
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PROJECT # 12455
H & Q INTERSECTION IMPROVEMENTS
ELECTRICAL LAYOUT SITE PLAN SHEET 3

SHEET NO.	OF
E10	22
TOTAL:	63
CAD FILE: 12444-MULTI-ELC2	
DRAWING FILE NO. 4-141-47	

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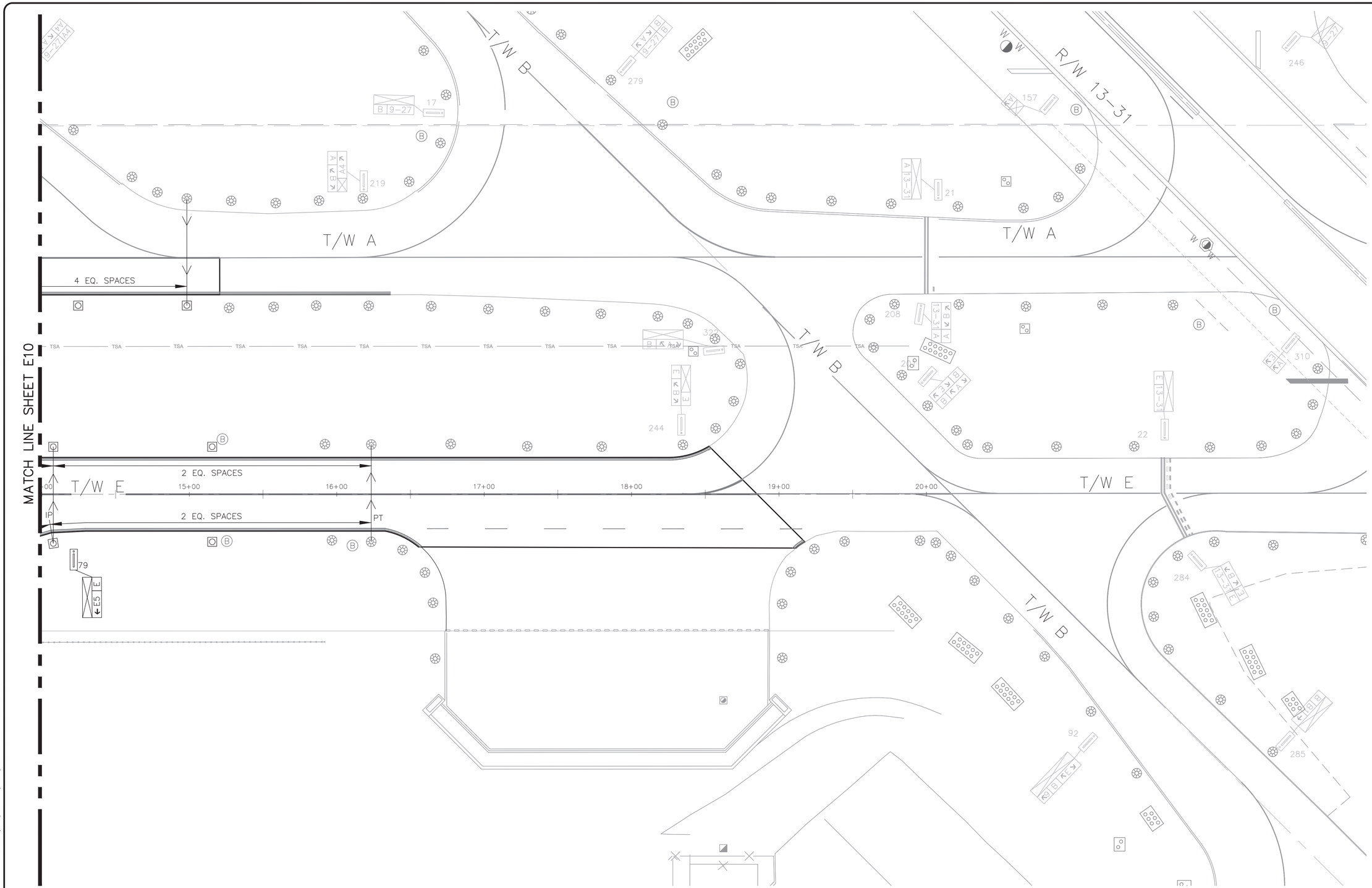

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(561) 451-4886 FAX

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PROJECT # 12455
H & Q INTERSECTION IMPROVEMENTS
ELECTRICAL LAYOUT SITE PLAN SHEET 4

SHEET NO.	OF
E11	22

TOTAL: 63

CAD FILE: 12444-MULTI-ELC2

DRAWING FILE NO. 1-141-47

REVISIONS

NO.	DATE	BY	CHK'D	DESCRIPTION

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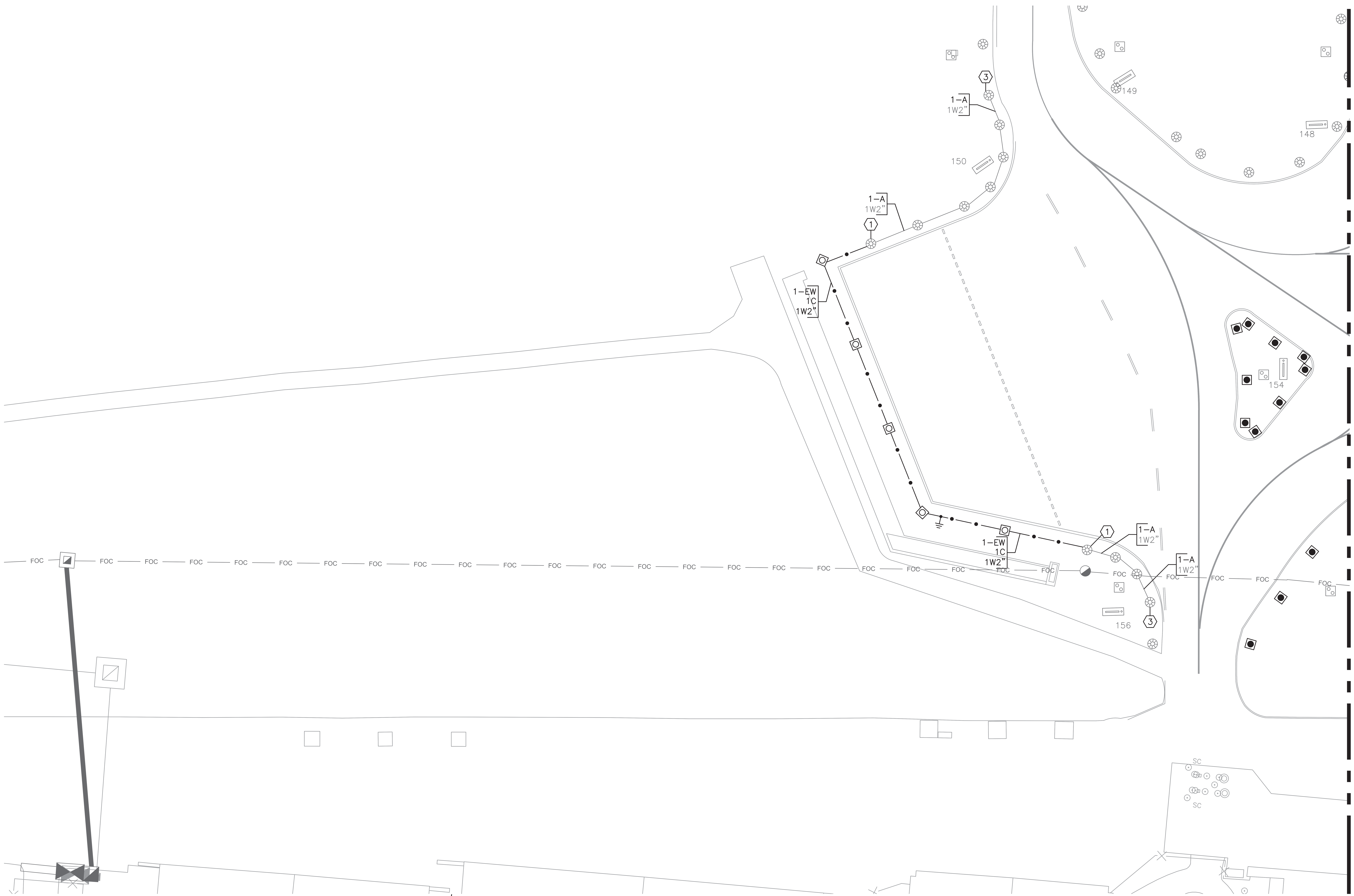

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NO.	DATE	BY	CHK'D	DESCRIPTION

PROJECT # 12455
H & Q INTERSECTION IMPROVEMENTS
ELECTRICAL CIRCUITRY SITE PLAN SHEET 1

SHEET NO. E12 OF 22

TOTAL: 63

CAD FILE: 12444-MULTI-ELC3

DRAWING FILE NO. 4-141-47

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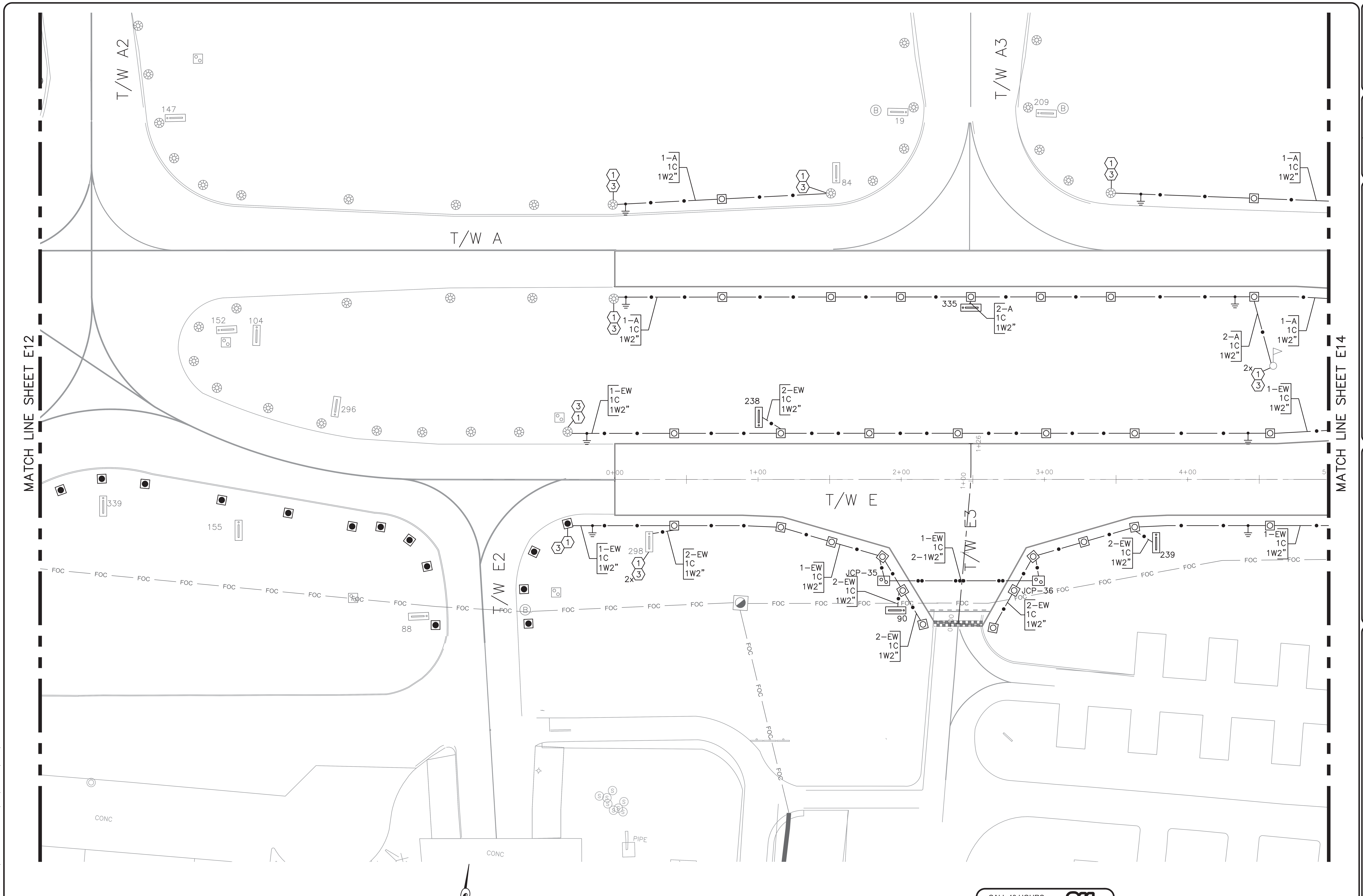

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THERE ARE A NUMBER OF AIRPORT, PUBLIC UTILITIES, AND FAA LIGHTING. COMMUNICATIONS, UNDERGROUND CABLES AND PIPES TRAVERSING THE AIRFIELD PAVEMENTS AREAS. THE ENGINEER HAS MADE EVERY ATTEMPT TO SHOW THE APPROXIMATE LOCATION OF ALL ITEMS. HOWEVER, THE ENGINEER IS NOT RESPONSIBLE FOR SHOWING OR LOCATING EVERY ITEM CURRENTLY IN PLACE. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO HAVE EVERY ITEM LOCATED, FLAGGED, AND IDENTIFIED PRIOR TO STARTUP OF CONSTRUCTION. ANY DAMAGE DONE TO ANY OF THE EXISTING ITEMS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. THE CONTRACTOR SHALL REPAIR ANY ITEM DAMAGED, CAUSED BY THEIR ACTIONS, WITH NO ADDITIONAL COMPENSATION.

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HILLERS ELECTRICAL ENGINEERING, INC.

BID SET

State of Florida
Professional Engineer
License No. 73735
AMY L. CHAMPAGNE - BAKER

DRAWN BY:	DATE:
DEU	01/22/21
DESIGNED BY:	SCALE:
ALC	1" = 30'
CHECKED BY:	
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CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

REVISIONS

NO.	DATE	BY	CHK'D	DESCRIPTION

PROJECT # 12455
H & Q INTERSECTION IMPROVEMENTS
ELECTRICAL CIRCUITRY SITE PLAN SHEET 2

SHEET NO. E13 OF 22
TOTAL: 63
CAD FILE: 12444-MULTI-ELC3
DRAWING FILE NO. 4-141-47

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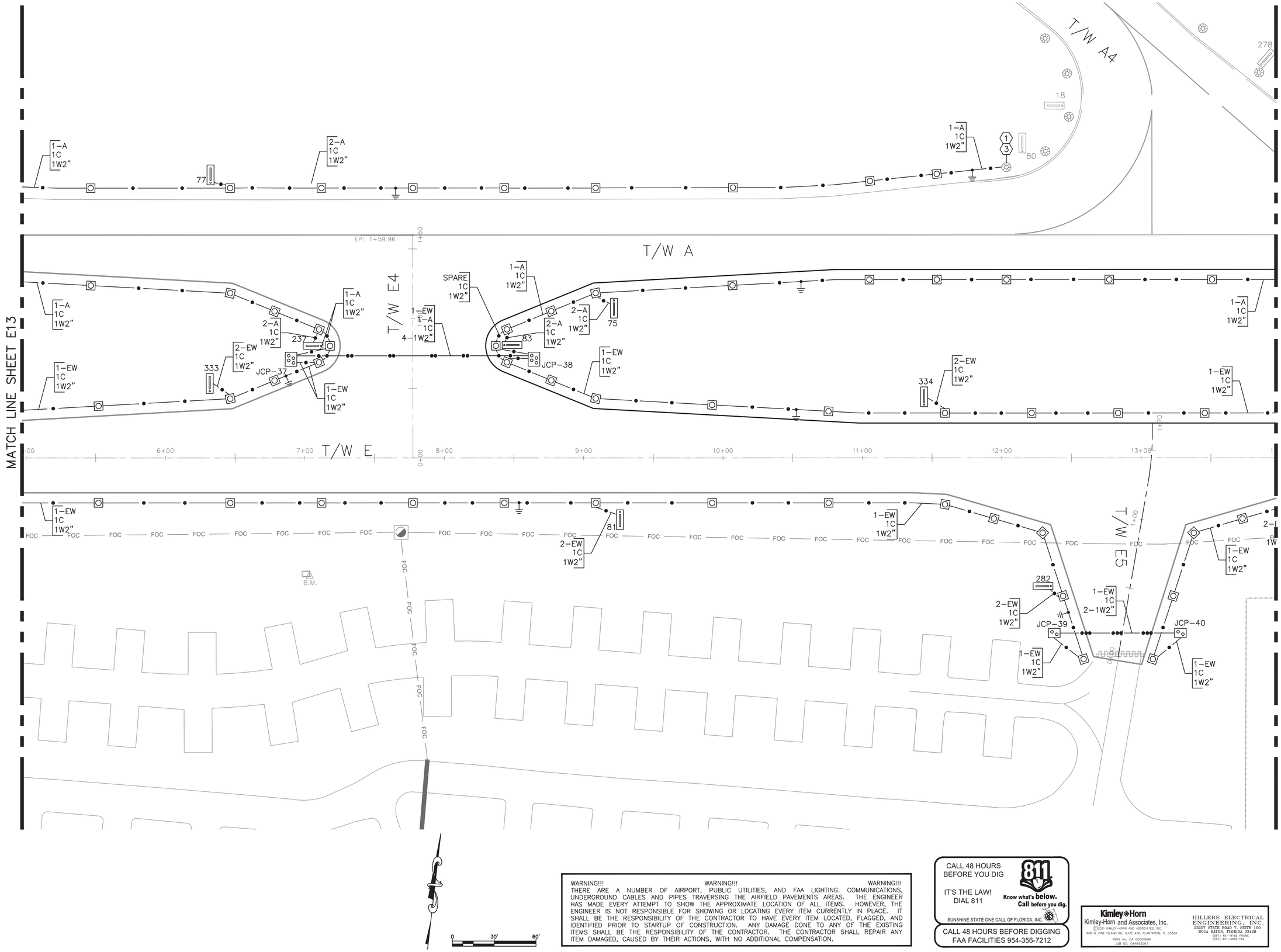

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23257 STATE ROAD 7, SUITE 100
BOCA RATON, FLORIDA 33428
(561) 451-1945 PHONE
(561) 451-4886 FAX

BID SET

State of Florida
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License No. 73735
AMY L. CHAMPAGNE - BAKER

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NO.	DATE	BY	CH'D	DESCRIPTION

PROJECT # 12455
H & Q INTERSECTION
IMPROVEMENTS
ELECTRICAL CIRCUITRY SITE PLAN SHEET 3

SHEET NO.	OF
E14	22

TOTAL: 63

CAD FILE: 12444–MULTI–ELC3

DRAWING FILE NO. 4–141–47

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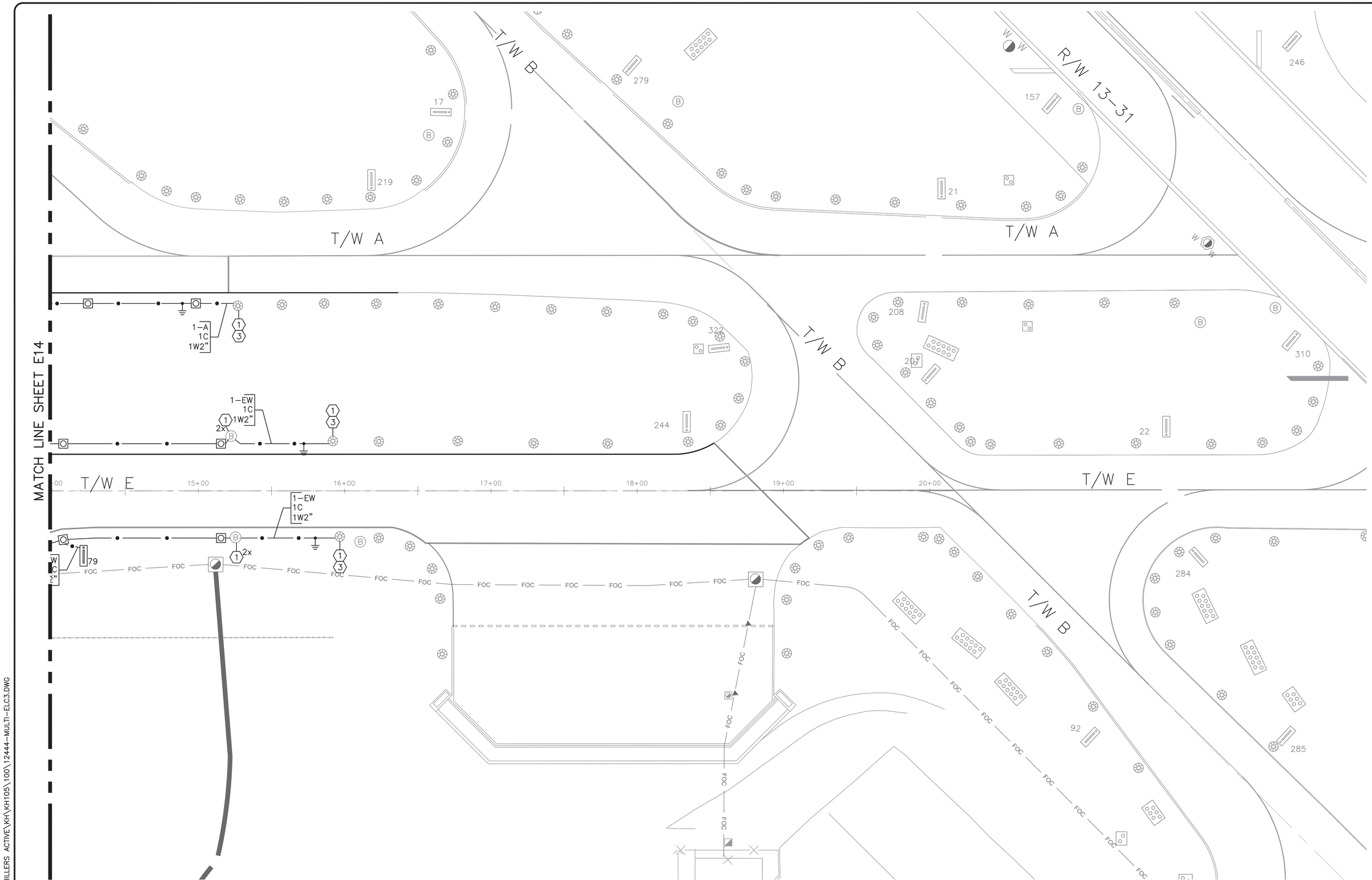

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WARNING!!! WARNING!!! WARNING!!!
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23257 STATE ROAD 7, SUITE 100
BOCA RATON, FLORIDA 33428
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REVISIONS			
NO.	DATE	BY	CHK'D	DESCRIPTION

PROJECT # 12455
H & Q INTERSECTION IMPROVEMENTS
ELECTRICAL CIRCUITRY SITE PLAN SHEET 4

SHEET NO.	OF
E15	22
TOTAL:	63
CAD FILE: 12444-MULTI-ELC3	
DRAWING FILE NO. 4-141-47	

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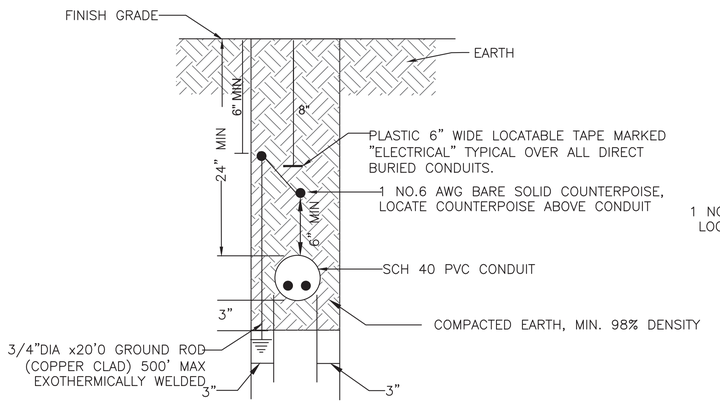
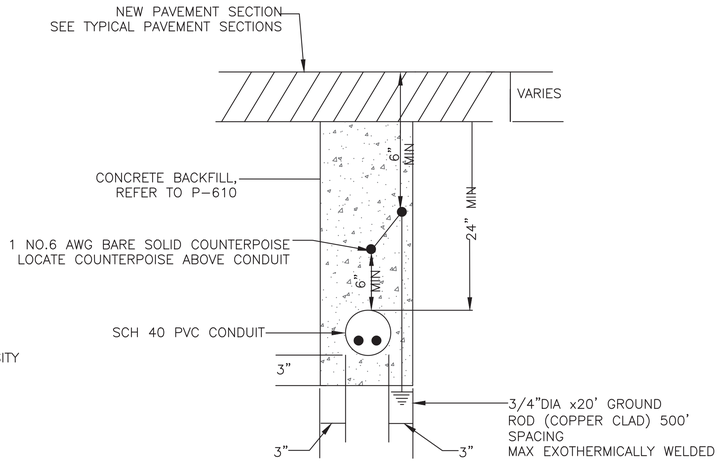


TYPICAL CONDUIT INSTALLATIONS IN EARTH

NOT TO SCALE



TYPICAL CONDUIT INSTALLED IN NEW FULL STRENGTH PAVEMENT

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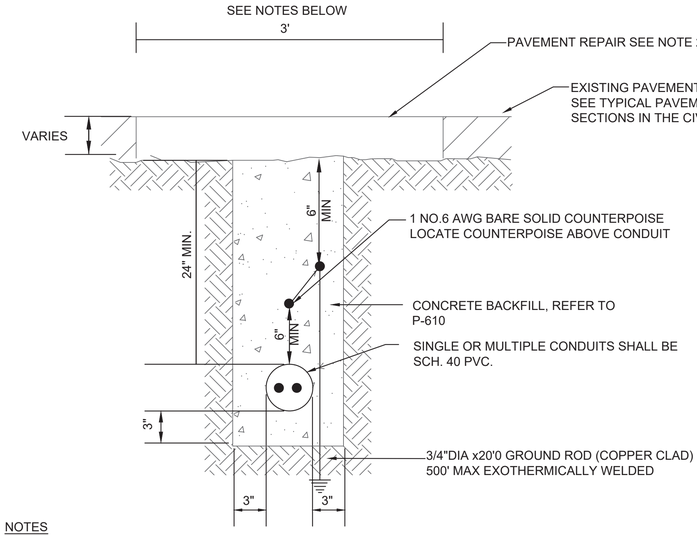

NOTES

1. SAWCUT EXISTING PAVEMENT AND REMOVE 3 FT. WIDE SECTION OF EXISTING BITUMINOUS PAVEMENT TO EXISTING LIMEROCK BASE.
2. REPAIR OF BITUMINOUS PAVEMENT SHALL BE AS SHOWN ON CIVIL PLANS.
3. MINIMUM COVER OVER CONDUIT SHALL BE 24" UNDER AIRFIELD PAVEMENTS.

TYPICAL CONDUIT INSTALLED IN EXISTING FULL STRENGTH/SHOULDER PAVEMENT

NOT TO SCALE

HORIZONTAL STAGGERING OF SPACERS AND JOINTS

NOT TO SCALE

DUCT MARKERS

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NO.	DATE	BY	CHK'D	DESCRIPTION

PROJECT # 12455
H & Q INTERSECTION IMPROVEMENTS
ELECTRICAL DETAILS

BID SET

SHEET NO. E16 OF 22
TOTAL: 63
CAD FILE: 12444-E16-DETL
DRAWING FILE NO. 4-141-47

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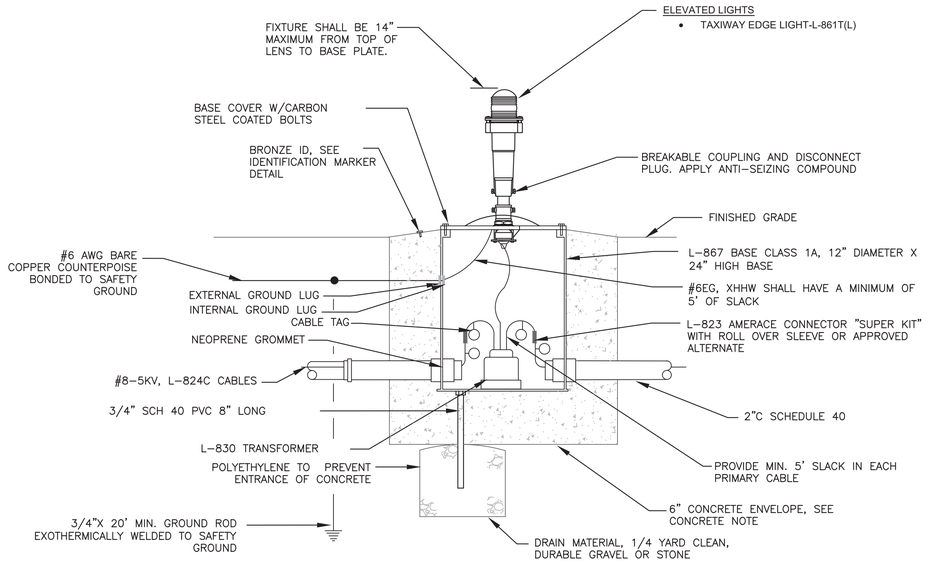
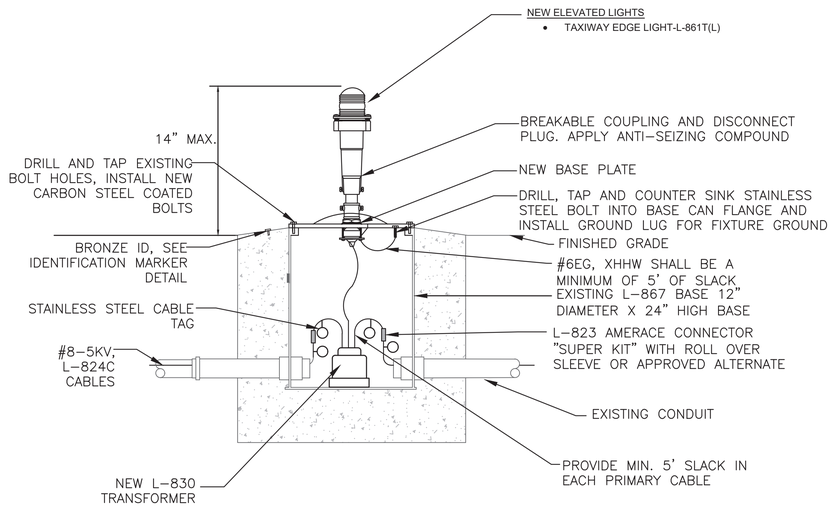


NEW ELEVATED TAXIWAY BASE MOUNTED LIGHT ON NEW BASE CAN IN EARTH

NOT TO SCALE

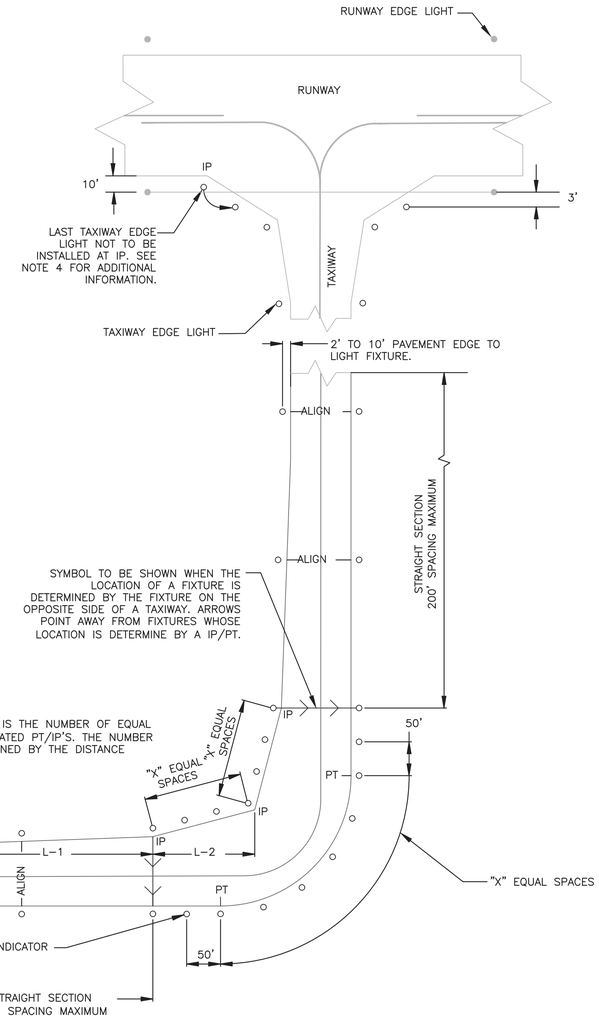


NEW ELEVATED TAXIWAY EDGE LIGHT ON EXISTING BASE CAN

NOT TO SCALE

EDGE LIGHT CONFIGURATION NOTES:

1. EDGE LIGHTS INSTALLED IN NEW SHOULDER/FULL STRENGTH PAVEMENT OR EARTH SHALL BE INSTALLED AT 8' FROM OUTSIDE EDGE OF TAXIWAY/RUNWAY EDGE STRIPE TO CENTER OF LIGHT FIXTURE.
2. EDGE LIGHTS INSTALLED IN THE EXISTING FULL STRENGTH/SHOULDER PAVEMENT OR EARTH SHALL MATCH THE EXISTING LIGHT OFFSET FROM OUTSIDE EDGE OF TAXIWAY/RUNWAY EDGE STRIPE, NOT TO EXCEED 10' TO CENTER OF LIGHT FIXTURE. SHOULD NEW OFFSET DIFFER FROM EXISTING OFFSET, CONTRACTOR SHALL COORDINATE AND VERIFY OFFSETS WITH ENGINEER/OWNER PRIOR TO INSTALLATION.
3. ALL EDGE LIGHTS SHALL BE INSTALLED PER FAA AC150/5340-30, LATEST EDITION. LIGHTS INSTALLED ON OPPOSITE SIDES OF RUNWAYS AND STRAIGHT SECTIONS OF TAXIWAYS ARE ALIGNED SUCH THAT OPPOSING LIGHTS ARE IN A LINE PERPENDICULAR WITH THE CENTERLINE.
4. THE LAST TAXIWAY EDGE LIGHT AT A RUNWAY/TAXIWAY EDGE INTERSECTION MUST BE PLACED AT AN ADDITIONAL 3 FEET FROM THE RUNWAY EDGE LIGHT OFFSET LINE. THE OFFSET IS NECESSARY TO MINIMIZE ANY POTENTIAL CONFLICT WITH RUNWAY EDGE LIGHTS.



TYPICAL TAXIWAY EDGE LIGHTING CONFIGURATION

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25257 STATE ROAD 7, SUITE 100
BOCA RATON, FLORIDA 334428
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(561) 451-4886 FAX

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Professional Engineer
License No. 73735
AMY L. CHAMPAGNE - BAKER

DRAWN BY:	DEU
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DATE:	01/22/21
SCALE:	NONE
FIELD BOOK:	

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REVISIONS

NO.	DATE	BY	CHK'D	DESCRIPTION

PROJECT # 12455
H & Q INTERSECTION IMPROVEMENTS
ELECTRICAL DETAILS

SHEET NO.	OF
E17	22
TOTAL:	63
CAD FILE:	12444-E17-DETL
DRAWING FILE NO.	4-141-47

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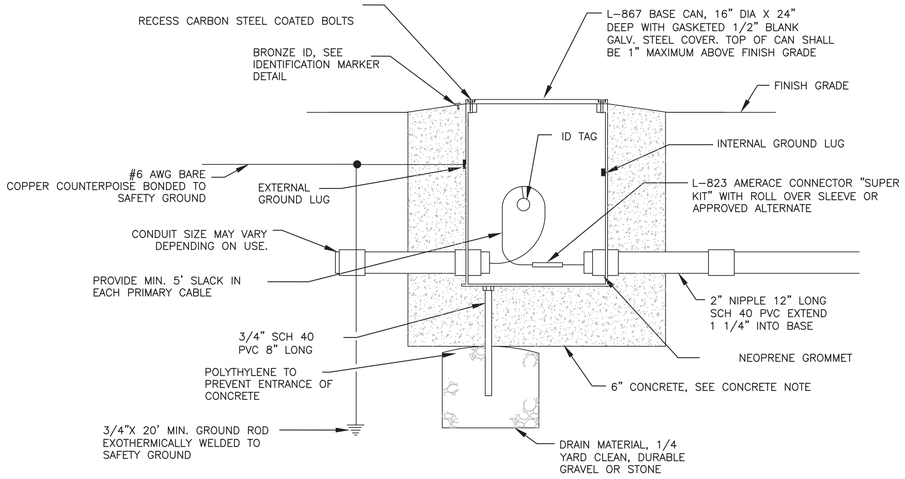

L-867 JUNCTION BOX DETAIL

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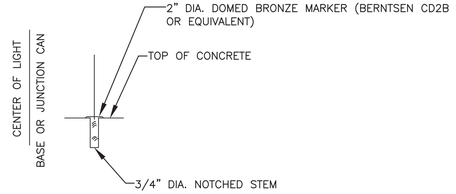
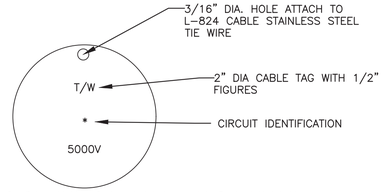


1. IDENTIFICATION SHALL BE STAMPED USING 1/2" FIGURES AND LETTERS UNIFORMLY SPACED ON THE BRONZE MARKER.

2. IDENTIFICATION MARKERS SHALL BE UNIFORMLY INSTALLED ADJACENT TO TAXIWAY AND RUNWAY ELEVATED EDGE LIGHTS. PREFERRED LOCATION IS ON A LINE PERPENDICULAR TO RUNWAY OR TAXIWAY CENTERLINE, INBOARD OF LIGHT FIXTURE.

IDENTIFICATION MARKER FOR LIGHT BASE CANS, JUNCTION CANS AND JUNCTION CAN PLAZAS

NOT TO SCALE



STAINLESS STEEL CABLE ID TAG DETAIL

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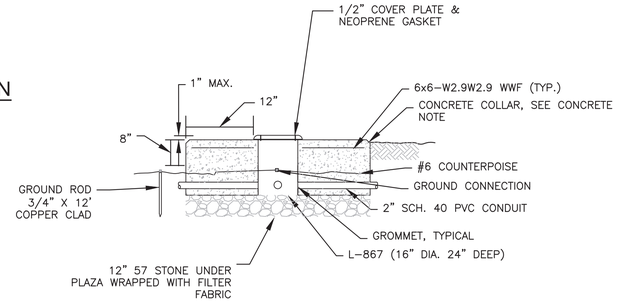

JUNCTION CAN PLAZA ELEVATION

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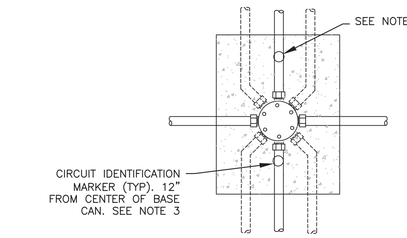
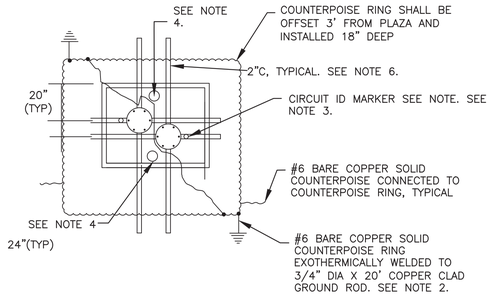


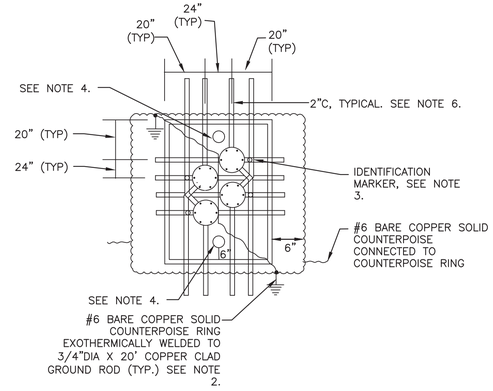
PLAN VIEW

NOT TO SCALE



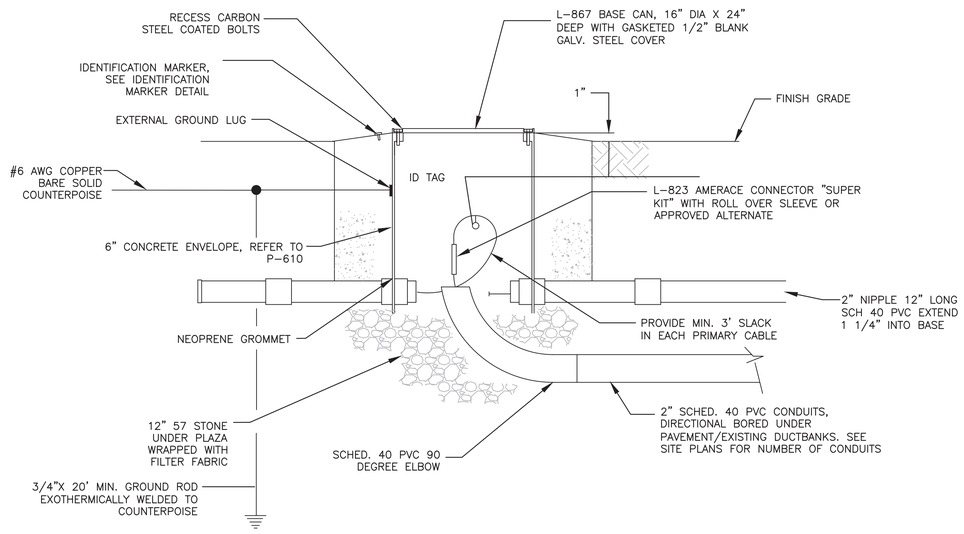
2 JUNCTION CAN PLAZA

NOT TO SCALE



4 JUNCTION CAN PLAZA

NOT TO SCALE



L-867 BOTTOMLESS CAN

NOT TO SCALE

NOTES:

1. NUMBER AND ORIENTATION OF CONDUITS VARY. SEE PLAN SHEETS FOR DETAILS.
2. INSTALL GROUND RODS AT ALL JUNCTION CAN PLAZAS AS SHOWN. TWO GROUND RODS PER PLAZA LOCATED AT OPPOSITE CORNERS SHALL BE PROVIDED.
3. CONTRACTOR SHALL PROVIDE A 2" DIA DOMED BRONZE MARKER AT EACH JUNCTION CAN AS SHOWN. MARKER SHALL BE STAMPED WITH CIRCUIT IDENTIFICATION AS COORDINATED WITH AIRPORT AND ENGINEER. IF CAN IS LEFT EMPTY INSTALL A BLANK MARKER FOR FUTURE USE.
4. CONTRACTOR SHALL PROVIDE A 2" DIA DOMED BRONZE MARKER STAMPED WITH THE PLAZA IDENTIFICATION NUMBER AS SHOWN ON THE DRAWINGS.
5. 2 AND 4 CAN L-867 JUNCTION CANS AND CONDUIT CONFIGURATION. SEE LAYOUT PLAN SHEETS FOR ORIENTATION.
6. EACH CAN SHALL HAVE A MINIMUM OF FOUR OPENINGS, LOCATIONS OF OPENINGS CAN BE AT 0, 45, 90, 135, 180, 225, 270 AND 315 DEGREES THAT EXTEND 3 FEET BEYOND PLAZA EDGE. LOCATIONS WILL VARY DEPENDING ON SIZE OF JUNCTION CAN PLAZA. CONDUIT OPENINGS AT 45, 135, 225 AND 315 DEGREES WILL HAVE A 3" OFFSET FROM THE REMAINING THREE OPENINGS. CONTRACTOR SHALL COORDINATE OPENINGS PRIOR TO INSTALLATION. CANS SHALL NOT BE CONNECTED TOGETHER INSIDE JUNCTION PLAZA. ALL CONDUITS EXITING THE CANS SHALL BE DEDICATED. CONDUITS WHICH ARE NOT USED IN THIS PROJECT SHALL BE CAPPED.
7. CONDUITS WHICH ARE NOT USED IN THIS PROJECT SHALL BE CAPPED 3' OUTSIDE OF PLAZA CONCRETE.
8. CONTRACTOR SHALL COORDINATE THE ORIENTATION OF THE PLAZA WITH THE ENGINEER AND OAR PRIOR INSTALLATION.
9. SEE DETAIL FOR CONNECTION TO JUNCTION CANS.

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22227 STATE ROAD 7, SUITE 100
BOCA RATON, FLORIDA 33428
(561) 451-0185 PHONE
(561) 451-4886 FAX

BID SET

State of Florida
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License No. 73735
AMY L. CHAMPAGNE - BAKER

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DESIGNED BY:	ALC
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DATE:	01/22/21
SCALE:	NONE
FIELD BOOK:	

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ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

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PROJECT # 12455
H & Q INTERSECTION IMPROVEMENTS
ELECTRICAL DETAILS

SHEET NO.	E18
OF	22
TOTAL:	63
CAD FILE:	12444-E18-DETL
DRAWING FILE NO.	4-141-47

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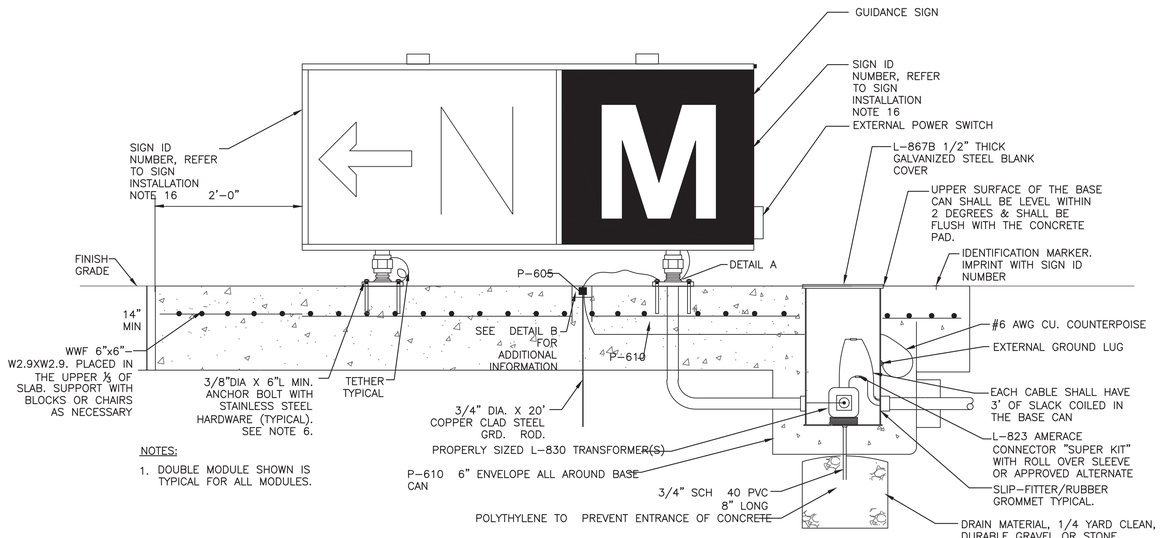


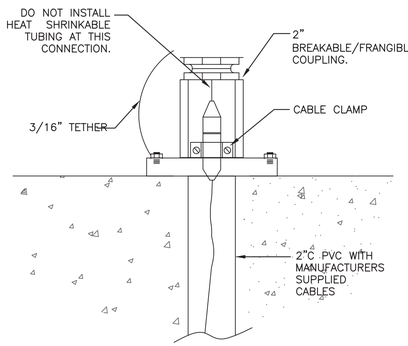
NOTES:

1. DOUBLE MODULE SHOWN IS TYPICAL FOR ALL MODULES.

L-858 GUIDANCE SIGN AND CONCRETE BASE DETAIL

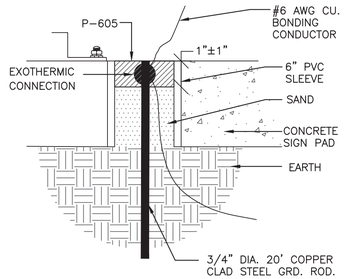
NOT TO SCALE

NOTE: FOR SIGN INSTALLATION IN EXISTING PAVEMENT CONTRACTOR SHALL SAWCUT THE EXISTING PAVEMENT AND INSTALL SIGN FLUSH WITH FINISHED GRADE. SOIL UNDER SUB-BASE SHALL BE STABILIZED AND COMPACTED PER SPEC P-152



DETAIL "A"

NOT TO SCALE



DETAIL "B"

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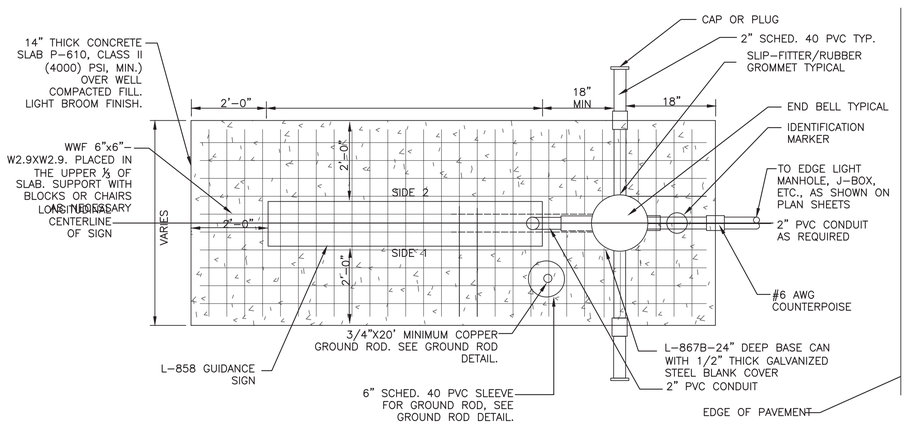

L-858 GUIDANCE SIGN PLAN VIEW

NOT TO SCALE

SIGN INSTALLATION NOTES

1. ALL MATERIALS, SIGN BASE DETAILS, ETC. SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.
2. THE CONCRETE SHALL COMPLY WITH P-610 SPECIFICATION, CLASS II.
3. P-610 CONCRETE STEEL REINFORCEMENT SHALL BE TYPE ASTM A615 GRADE 60. ALL REINFORCEMENTS SHALL HAVE A 2" MINIMUM CONCRETE COVER. REINFORCEMENT MAY BE ADJUSTED TO MISS INTERFERENCES.
4. FOR LOCATION AND ORIENTATION OF SIGN AND FOUNDATION SEE PLANS.
5. THE ORIENTATION, INSTALLATION AND DEPTH OF THE 2" CONDUIT FOR SIGN CIRCUITS SHALL BE COORDINATED WITH THE PLANS.
6. METHODS OF SIGN INSTALLATION INCLUDING BOLT PATTERNS, ANCHOR METHODS AND ATTACHMENT DETAILS SHALL BE IN ACCORDANCE WITH THE MANUFACTURER RECOMMENDATIONS.
7. ALL SIGNS SHALL BE INSTALLED WITH TETHERS ON A MINIMUM OF 2 LEGS PER SIGN. TETHERS SHALL BE 3/16" STAINLESS STEEL AIRCRAFT CABLE WITH A FORMED EYE ON BOTH ENDS. THE TETHER SHALL OF SUFFICIENT LENGTH TO HAVE 2" LACK (MIN.) WHEN ATTACHED BETWEEN SIGN AND THE FIXTURE PLATE.
8. SIDE VIEW, PLAN VIEW, GRADE AND FILL DETAILS AND DETAILS A AND B ARE TYPICAL FOR SIGNS.
9. ALL CONDUIT SHALL BE 2" SCHEDULE 40 PVC UNLESS NOTED OTHERWISE.
10. THE CONTRACTOR SHALL VERIFY THAT THE 6" SLEEVE IS LARGE ENOUGH TO ACCOMMODATE THE EXOTHERMIC CONNECTION. THE TOP OF THE GROUND ROD SHALL BE FLUSH WITH THE TOP OF THE SLAB. THE GROUND ROD SHALL NOT BE DRIVEN AFTER THE GROUNDING CONNECTION HAS BEEN MADE.
11. SIGN LOCATIONS INDICATED ON THE PLANS ARE 10' MIN TO 20' MAX PERPENDICULAR DISTANCE FROM THE TAXIWAY/RUNWAY EDGE STRIPE TO THE NEAREST SIDE OF SIGN. SIGNS SHALL BE STAKED IN THE FIELD, ORIENTATION AND LOCATION SHALL BE APPROVED BY RPR PRIOR TO INSTALLATION.
12. THE SIGN TETHER AND BONDING CONDUCTOR SHALL NOT BE ATTACHED AT THE SAME ANCHOR BOLT. AN APPROVED MECHANICAL OR COMPRESSION LUG SHALL BE USED TO CONNECT THE BONDING CONDUCTOR TO THE SIGN FLANGE AND SIGN. THE TETHERS AND BONDING CONDUCTORS SHALL BE OF SUFFICIENT LENGTH TO ALLOW THE FRANGIBLE COUPLING TO OPERATE WITHOUT RESTRICTIONS AND TO ALLOW THE CABLE TO UNPLUG IF THE SIGN FALLS OVER.
13. STRUCTURAL FILL FOR SIGN CONCRETE FOUNDATION PADS SHALL BE FREE-DRAINING, AS APPROVED BY THE ENGINEER SHALL BE PLACED IN HORIZONTAL LIFTS NOT TO EXCEED 4" IN LOOSE DEPTH AND COMPACT TO 95% MAXIMUM DENSITY AT 0 TO 2% ABOVE OPTIMUM MOISTURE AS DETERMINED BY ASTM D698 PAYMENT FOR EMBANKMENT MATERIALS AND PLACEMENT SHALL BE INCIDENTAL TO SIGN BID ITEM. SLOPE SHALL NOT EXCEED 1:20 WITHOUT PERMISSION OF THE ENGINEER.
14. ALL AREAS FOR THE LEG FLANGE PLATES SHALL BE IN THE SAME PLANE.
15. MINIMUM BURIAL DEPTH OF 2" SCHEDULE 40 PVC CONDUIT IS 24".
16. PROVIDE 3-M SCOTCH-LITE OR APPROVED EQUIVALENT 3-INCH-HIGH, DIE CUT LABELS FOR EACH SIGN, LABELS SHALL BE REFLECTIVE FILM, WITH PRESSURE-SENSITIVE ADHESIVE BACKING, SUITABLE FOR EXTERIOR APPLICATIONS. LABELS SHALL BE UV RESISTANT. LABELS SHALL BE WHITE FOR INSTALLATION ON BLACK SURFACE, BLACK FOR INSTALLATION ON OTHER SURFACES. TEXT SHALL BE: NUMBER AND LETTER STYLE; HELVETICA MEDIUM, UPPER CASE, 3 INCHES IN HEIGHT.

State of Florida
Professional Engineer
License No. 73735
AMY L. CHAMPAGNE - BAKER

DRAWN BY:	DATE:
DEU	01/22/21
DESIGNED BY:	SCALE:
ALC	NONE
CHECKED BY:	
JWK	
FIELD BOOK:	

CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

REVISIONS				
NO.	DATE	BY	CHK'D	DESCRIPTION

PROJECT # 12455
H & Q INTERSECTION IMPROVEMENTS
ELECTRICAL SIGNAGE DETAILS

BID SET

SHEET NO.	OF
E19	22
TOTAL:	63
CAD FILE: 12444-E19-DETL	
DRAWING FILE NO. 4-141-47	

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1920 WOOVA WAY, SUITE 200, WEST PALM BEACH, FL 33411
FBPE No. CA 00000696
044663065

HILLERS ELECTRICAL ENGINEERING, INC.
22207 STATE ROAD 7, SUITE 100
BOCA RATON, FLORIDA 33428
(561) 451-9185 PHONE
(561) 451-4886 FAX

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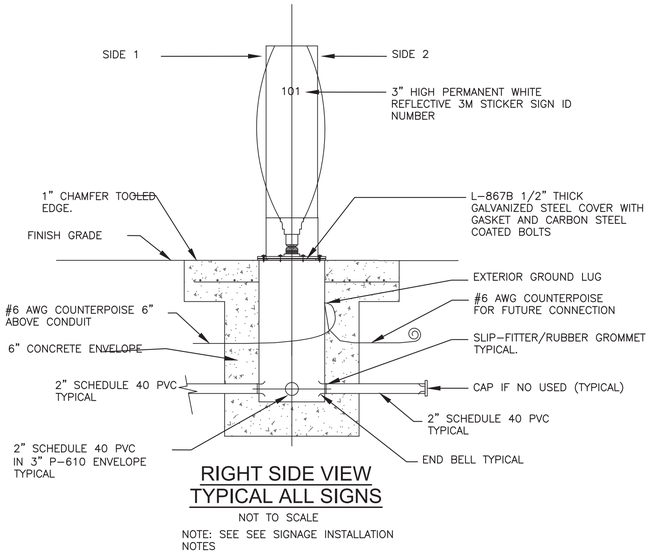
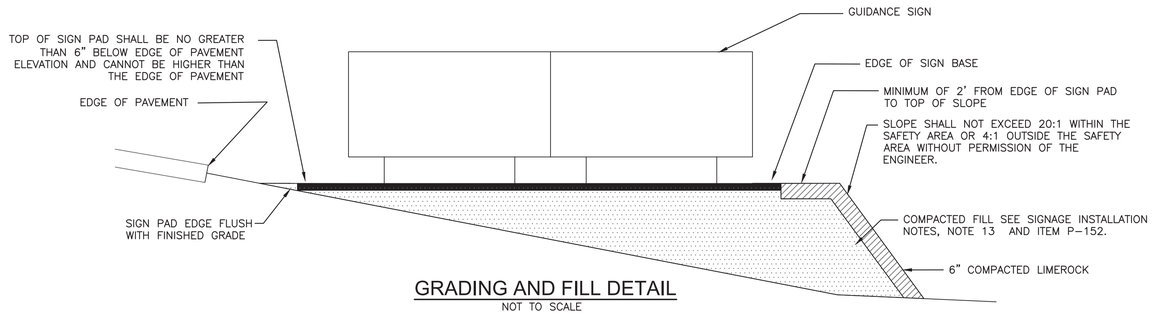


RIGHT SIDE VIEW TYPICAL ALL SIGNS

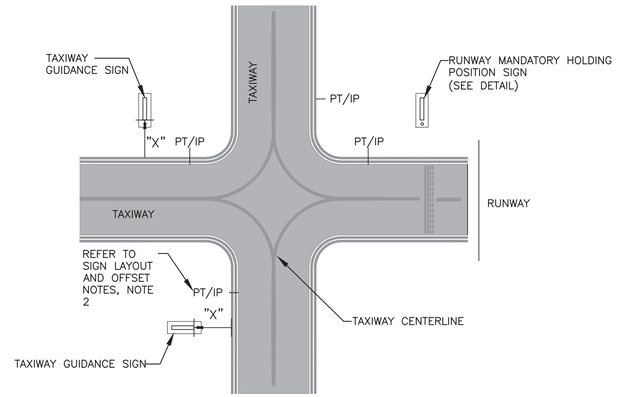
NOT TO SCALE

NOTE: SEE SEE SIGNAGE INSTALLATION NOTES



GRADING AND FILL DETAIL

NOT TO SCALE



GUIDANCE SIGN TYPICAL OFFSET AND POSITIONS

EXAMPLE OF A PERPENDICULAR TAXIWAY CONNECTOR LESS THAN 150' WIDE
NOT TO SCALE

"X" = OFFSET DISTANCE FROM DEFINED PAVEMENT EDGE (OUTSIDE EDGE OF OUTBOARD STRIPE) TO THE NEAREST EDGE OF THE GUIDANCE SIGN FRAME.
SIZE 1 SIGNS = REQUIRED FAA OFFSET 10'-20', TYPICAL OFFSET IS 15'

SIGN LAYOUT AND OFFSET NOTES:

1. MANDATORY HOLDING POSITION SIGNS SHALL BE LOCATED 5' FROM THE FIRST STRIPE CLOSEST TO THE TAXIWAY CENTERLINE OF THE HOLDING POSITION MARKINGS WITH A TOLERANCE OF 0'/+10' FARTHER AWAY FROM HOLD POSITION MARKING, SEE FAA AC150/5340-18, LATEST EDITION.
2. RUNWAY EXIT SIGNS AND TAXIWAY GUIDANCE SIGNS SHALL BE TYPICALLY LOCATED 15' PRIOR TO THE POINT OF TANGENCY (PT)/INTERSECTION POINT(IP). SEE GEOMETRY PLANS FOR PT/IP LOCATIONS. ALL SIGNS SHALL BE STAKED IN THE FIELD AND THE FINAL LOCATION APPROVED BY RPR PRIOR TO INSTALLATION.
3. ALL SIZE 1 SIGNS SHALL BE INSTALLED AT 15' FROM THE DEFINED EDGE OF PAVEMENT TO THE NEAREST EDGE OF THE GUIDANCE SIGN FRAME. IF A SIGN CANNOT BE INSTALLED AT ITS STANDARD LOCATION DUE TO AN OBSTRUCTION, A TOLERANCE OF 10 TO 20 FEET FROM THE DEFINED EDGE OF PAVEMENT TO THE NEAREST EDGE OF THE GUIDANCE SIGN FRAME IS ALLOWED AS STATED IN FAA AC150/5340-18 LATEST EDITION.
4. SIGN ELEVATION SHALL BE SET SO THAT THE TOP OF THE SIGN IS AT A MAXIMUM OF 30" MEASURED FROM THE TOP OF THE SIGN TO GRADE, PER THE REQUIREMENT OF FAA AC 150/5340-18, LATEST EDITION TABLE 1. SIGN SHALL HAVE A MINIMUM OF 12" REQUIRED CLEARANCE BETWEEN THE TOP OF THE SIGN AND THE BOTTOM OF THE WING OF THE AIRPORT CRITICAL AIRCRAFT.

State of Florida
Professional Engineer
License No. 73735
AMY L. CHAMPAGNE - BAKER

DRAWN BY:	DATE:	01/22/21
DEU	SCALE:	NONE
DESIGNED BY:	CHECKED BY:	
ALC	JWK	
FIELD BOOK:		

CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

REVISIONS

NO.	DATE	BY	CHK'D	DESCRIPTION

PROJECT # 12455
H & Q INTERSECTION IMPROVEMENTS
ELECTRICAL SIGNAGE DETAILS

SHEET NO.	OF
E20	22

TOTAL: 63

CAD FILE: 12444-E20-DETL

DRAWING FILE NO. 4-141-47

BID SET

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1920 WOHVA WAY, SUITE 200, WEST PALM BEACH, FL 33411
FBPE No. CA 00000696
044693068

HILLERS ELECTRICAL ENGINEERING, INC.
23257 STATE ROAD 7, SUITE 100
BOCA RATON, FLORIDA 33428
(561) 451-9185 PHONE
(561) 451-4886 FAX

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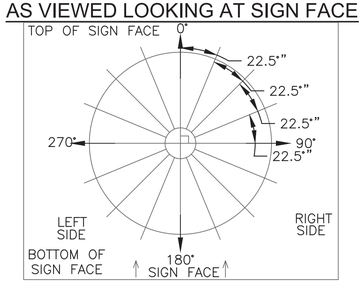
NEW LIGHTED SIGN PANEL SCHEDULE

SIGN NO.	NO. OF CHARACTERS	SIZE	STYLE	LAMP	TYPE SIDE 1 LEGEND	TYPE SIDE 2 LEGEND	CIRCUIT	Sheet No.	Remarks
75	4	1	2	LED	Y: ← E4 / L: A	BLANK	A	E10	
77	4	1	2	LED	L: A / Y: E4→	BLANK	A	E10	
79	4	1	2	LED	Y: ← E5 / L: E	BLANK	EW	E11	
81	4	1	2	LED	L: E / Y: E4→	BLANK	EW	E10	
83	5	1	2	LED	L: E4 / Y: ← E →	BLANK	A	E10	
90	5	1	2	LED	L: E3 / Y: ← E →	BLANK	EW	E09	
237	5	1	2	LED	L: E4 / Y: ← A →	BLANK	A	E10	
238	4	1	2	LED	L: E / Y: E3 →	BLANK	EW	E09	
239	4	1	2	LED	Y: ← E3 / L: E	BLANK	EW	E09	
282	5	1	2	LED	L: E5 / Y: ← E →	BLANK	EW	E10	
333	4	1	2	LED	Y: ← E4 / L: E	BLANK	EW	E10	
334	4	1	2	LED	L: E / Y: E5 →	BLANK	EW	E10	
335	4	1	2	LED	H: [redacted]	B	A	E09	

ARROW ROTATION ANGLE DATA AS VIEWED LOOKING AT SIGN FACE



SIGN PANEL NOTES:

1. ARROWS INDICATE DIRECTION OF TAXIWAYS.
2. IT IS THE RESPONSIBILITY OF CONTRACTOR TO ENSURE THAT THE DIRECTIONAL ARROWS ON ANGLED TAXIWAYS (NOT 90°) MATCHES CENTERLINE OF REFERENCED TAXIWAY TO THE NEAREST 22.5°: SEE ROSE COMPASS FOR GUIDANCE.
3. CONTRACTOR SHALL PROVIDE ALL SIGN LEGENDS AND BLANK PANELS REQUIRED BY THE SIGN PANEL SCHEDULE, MANUFACTURER AND FAA AC150/5340-18, LATEST EDITION.
4. CONTRACTOR SHALL PROVIDE MESSAGE DIVIDERS ON NEW AND EXISTING SIGNS TO BE REPANELED PER AC150/5340-18, LATEST EDITION. MESSAGE DIVIDERS SHALL BE INCLUSIVE TO THE LINE ITEMS FOR SIGNAGE.
5. SIGNS SHALL BE PAID BY CHARACTER, UNLESS OTHERWISE INDICATED. ONE CHARACTER SHALL BE DEFINED AS 1 LETTER, NUMERAL OR SPECIAL CHARACTER/PUNCTUATION REGARDLESS OF TEXT OR BACKGROUND COLOR CHANGES. SIGNS SHALL BE PAID FOR BY THE SIGN SIDE THAT HAS THE GREATEST NUMBER OF CHARACTERS AND SHALL NOT ACCOUNT FOR MESSAGE DIVIDERS OR CHANGE OF BACKGROUND COLOR. PANELS FOR BOTH SIDES OF SIGN SHALL BE INCLUSIVE TO THE LINE ITEM.

SIGN LEGEND NOTES:

SIGN TYPES:

L = TAXI LOCATION SIGN, BLACK BACKGROUND WITH YELLOW LETTERING AND A YELLOW BORDER.

D = RUNWAY DISTANCE TO GO SIGN, BLACK BACKGROUND WITH WHITE LETTERING.

Y = TAXIWAY DIRECTIONAL SIGN, YELLOW BACKGROUND WITH BLACK LETTERING.

R = MANDATORY HOLD SIGN, RED BACKGROUND WITH WHITE LETTERING OUTLINED IN BLACK.

I = INFORMATIONAL SIGN WITH YELLOW BACKGROUND WITH BLACK LETTERING

BID SET

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FBPE No. CA 00000698
044693068

HILLERS ELECTRICAL ENGINEERING, INC.
25557 STATE ROAD 7, SUITE 100
BOCA RATON, FLORIDA 33428
(561) 451-9165 PHONE
(561) 451-4886 FAX

State of Florida
Professional Engineer
License No. 73735
AMY L. CHAMPAGNE - BAKER

DRAWN BY: DEU
DESIGNED BY: ALC
CHECKED BY: JWK
DATE: 01/22/21
SCALE: NONE
FIELD BOOK:

CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

REVISIONS

NO.	DATE	BY	CHK'D	DESCRIPTION

PROJECT # 12455
H & Q INTERSECTION IMPROVEMENTS
ELECTRICAL SIGNAGE DETAILS

SHEET NO. E21 OF 22
TOTAL: 63
CAD FILE: 12444-E21-DETL
DRAWING FILE NO. 4-141-47

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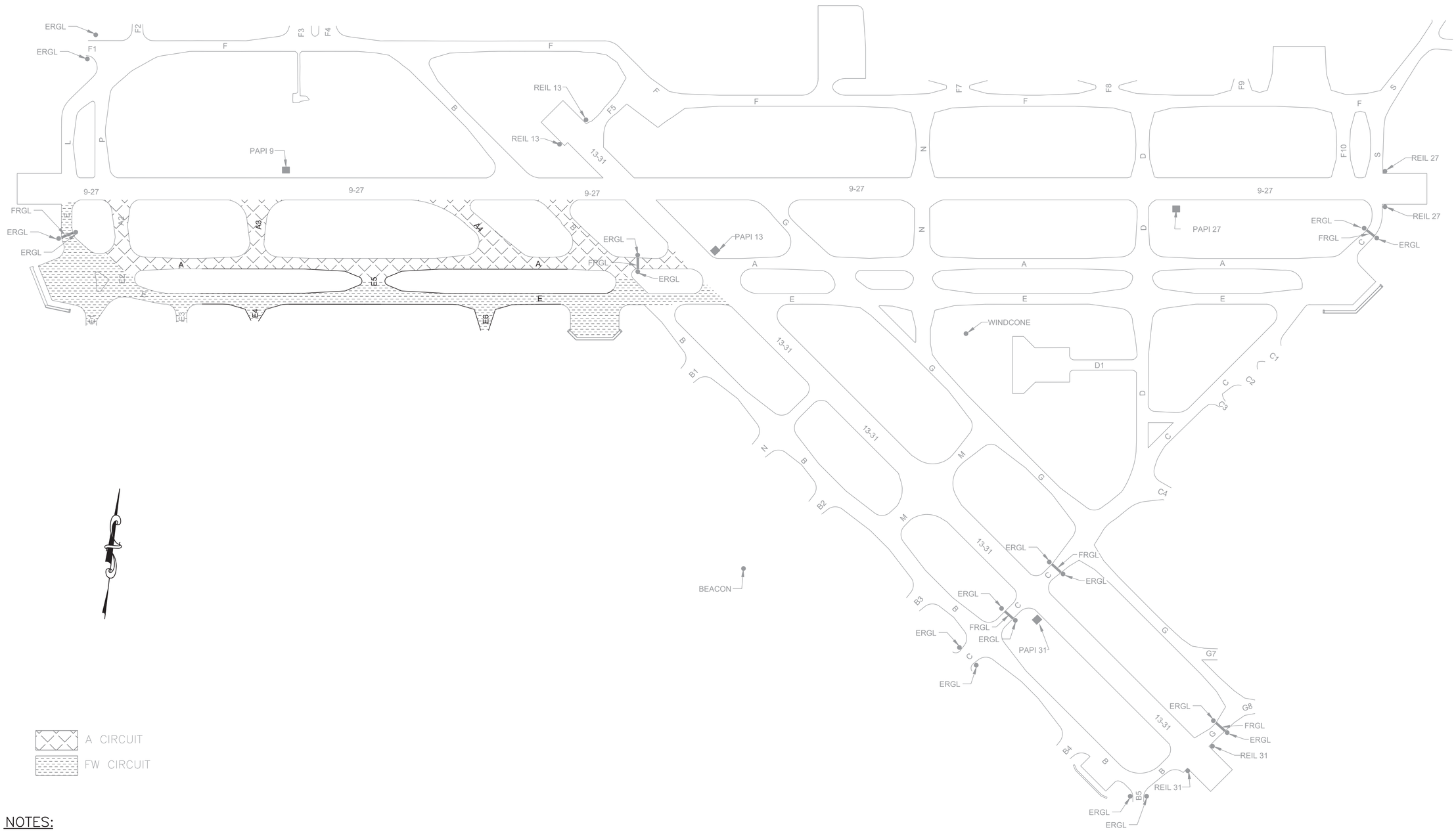

A CIRCUIT

FW CIRCUIT

NOTES:

1. CONTRACTOR SHALL UTILIZE THE ABOVE GRAPHIC FOR MODIFICATIONS TO THE EXISTING TOUCH SCREENS AND LAPTOP SYSTEMS.
2. PORTIONS OF EXISTING TAXIWAY HOTEL AND QUEBEC WILL BE REMOVED UNDER THIS PROJECT. REMAINING SECTIONS OF TAXIWAY HOTEL AND QUEBEC WILL BE RENAMED TO A3, A4, E3, E4 & E5 ACCORDINGLY. THE GRAPHIC SHOWN ON THIS SHEET DEPICTS THE NEW TAXIWAY GEOMETRY.

BID SET

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FBPE No. CA 00000696
044693068

HILLERS ELECTRICAL ENGINEERING, INC.
25257 STATE ROAD 7, SUITE 100
BOCA RATON, FLORIDA 33428
(561) 451-9185 PHONE
(561) 451-4886 FAX

State of Florida
Professional Engineer
License No. 73735
AMY L. CHAMPAGNE - BAKER

DRAWN BY:	DATE:
DEU	01/22/21
DESIGNED BY:	SCALE:
ALC	NONE
CHECKED BY:	
JWK	
FIELD BOOK:	

CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT
ENGINEERING & ARCHITECTURE
100 North Andrews Avenue, Fort Lauderdale, Florida 33301

REVISIONS

NO.	DESCRIPTION	BY	CHK'D	DATE

PROJECT # 12455
H & Q INTERSECTION IMPROVEMENTS
ELECTRICAL ALCMS TOUCH SCREEN GRAPHICS

SHEET NO.	OF
E22	22
TOTAL:	63
CAD FILE: 12444-E22-DETL	
DRAWING FILE NO. 4-141-47	

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CITY OF FORT LAUDERDALE
PUBLIC WORKS DEPARTMENT

MINORITY BUSINESS ENTERPRISE (MBE) - WOMEN BUSINESS ENTERPRISE (WBE)

PRIME CONTRACTOR IDENTIFICATION FORM

In order to assist us in identifying the status of those companies doing business with the City of Fort Lauderdale, this form must be completed and returned with your bid package.

Name of Firm:	
Address of Firm:	
Telephone Number:	
Name of Person Completing Form:	
Title:	
Signature:	
Date:	
City Project Number:	
City Project Description:	

Please check the item(s) which properly identify the status of your firm:

☐ Our firm is not a MBE or WBE.

☐ Our firm is a MBE, as at least 51 percent is owned and operated by one or more socially and economically disadvantaged individuals.

☐ American Indian ☐ Asian ☐ Black ☐ Hispanic

☐ Our firm is a WBE, as at least 51 percent is owned and operated by one or more women.

☐ American Indian ☐ Asian ☐ Black ☐ Hispanic

MBE/WBE CONTRACTOR INFORMATION

The City, in a continuing effort, is encouraging the increased participation of minority and women-owned businesses in Public Works Department related contracts. Along those lines, we are requiring that each firm provide documentation detailing their own programs for utilizing minority and women-owned businesses.

Submit this information as a part of this bid package and refer to the checklist, to ensure that all areas of concern are covered. The low responsive bidder may be contacted to schedule a meeting to discuss these objectives. It is our intention to proceed as quickly as possible with this project, so your cooperation in this matter is appreciated.

CONTRACTOR CHECKLIST

☐ List Previous City of Fort Lauderdale Contracts

☐ Number of Employees in your firm

--Percent (%) Women

--Percent (%) Minorities

--Job Classifications of Women and Minorities

☐ Use of minority and/or women subcontractors on past projects.

☐ Nature of the work subcontracted to minority and/or women-owned firms.

☐ How are subcontractors notified of available opportunities with your firm?

☐ Anticipated amount to be subcontracted on this project.

☐ Anticipated amount to be subcontracted to minority and/or women-owned businesses on this project.

QUESTIONNAIRE SHEET

PLEASE PRINT OR TYPE:

Firm Name:

President

Business Address:

Telephone: Fax:

E-Mail Address:

What was the last project of this nature which you completed? Include the year, description, and contract value.

The following are named as three corporations and representatives of those corporations for which you have performed work similar to that required by this contract, and which the City may contact as your references (include addresses, telephone numbers and e-mail addresses). Include the project name, year, description, and contract value.

How many years has your organization been in business?

Have you ever failed to complete work awarded to you; if so, where and why?

The name of the qualifying agent for the firm and his position is:

Certificate of Competency Number of Qualifying Agent:

Effective Date: Expiration Date:

Licensed in: Engineering Contractor's License #

(County/State)

Expiration Date:

NOTE: To be considered for award of this contract, the bidder must submit a financial statement upon request.

NOTE: Contractor must have proper licensing and shall provide copy of same with his proposal.

QUESTIONNAIRE SHEET

1. Have you personally inspected the proposed work and have you a complete plan for its performance?

2. Will you sublet any part of this work? If so, list the portions or specialties of the work that you will.

a)

b)

c)

d)

e)

f)

g)

3. What equipment do you own that is available for the work?

4. What equipment will you purchase for the proposed work?

5. What equipment will you rent for the proposed work?

NON-COLLUSION STATEMENT:

By signing this offer, the vendor/contractor certifies that this offer is made independently and *free* from collusion. Vendor shall disclose below any City of Fort Lauderdale, FL officer or employee, or any relative of any such officer or employee who is an officer or director of, or has a material interest in, the vendor's business, who is in a position to influence this procurement.

Any City of Fort Lauderdale, FL officer or employee who has any input into the writing of specifications or requirements, solicitation of offers, decision to award, evaluation of offers, or any other activity pertinent to this procurement is presumed, for purposes hereof, to be in a position to influence this procurement.

For purposes hereof, a person has a material interest if they directly or indirectly own more than 5 percent of the total assets or capital stock of any business entity, or if they otherwise stand to personally gain if the contract is awarded to this vendor.

In accordance with City of Fort Lauderdale, FL Policy and Standards Manual, 6.10.8.3,

> 3.3. City employees may not contract with the City through any corporation or business entity in which they or their immediate family members hold a controlling financial interest (e.g. ownership of five (5) percent or more).
>
> 3.4. Immediate family members (spouse, parents and children) are also prohibited from contracting with the City subject to the same general rules.

Failure of a vendor to disclose any relationship described herein shall be reason for debarment in accordance with the provisions of the City Procurement Code.

NAME	RELATIONSHIPS

In the event the vendor does not indicate any names, the City shall interpret this to mean that the vendor has indicated that no such relationships exist.

Authorized Signature

Title

Name (Printed)

Date

CONTRACTOR'S CERTIFICATE OF COMPLIANCE WITH NON-DISCRIMINATION PROVISIONS OF THE CONTRACT

The completed and signed form should be returned with the Contractor's submittal. If not provided with submittal, the Contractor must submit within three business days of City's request. Contractor may be deemed non-responsive for failure to fully comply within stated timeframes.

Pursuant to City Ordinance Sec. 2-187(c), bidders must certify compliance with the Non-Discrimination provision of the ordinance.

The Contractor shall not, in any of his/her/its activities, including employment, discriminate against any individual on the basis of race, color, national origin, religion, creed, sex, disability, sexual orientation, gender, gender identity, gender expression, or marital status.

1. The Contractor certifies and represents that he/she/it will comply with Section 2-187, Code of Ordinances of the City of Fort Lauderdale, Florida, as amended by Ordinance C-18-33 (collectively, "Section 2-187").

2. The failure of the Contractor to comply with Section 2-187 shall be deemed to be a material breach of this Agreement, entitling the City to pursue any remedy stated below or any remedy provided under applicable law.

3. The City may terminate this Agreement if the Contractor fails to comply with Section 2-187.

4. The City may retain all monies due or to become due until the Contractor complies with Section 2-187.

5. The Contractor may be subject to debarment or suspension proceedings. Such proceedings will be consistent with the procedures in section 2-183 of the Code of Ordinances of the City of Fort Lauderdale, Florida.

Authorized Signature

Print Name and Title

Date

CONSTRUCTION BID CERTIFICATION

Please Note: It is the sole responsibility of the bidder to ensure that his bid is submitted electronically through www.BidSync.com prior to the bid opening date and time listed. Paper bid submittals will not be accepted. All fields below must be completed. If the field does not apply to you, please note N/A in that field.

If you are a foreign corporation, you may be required to obtain a certificate of authority from the Department of State, in accordance with Florida Statute §607.1501 (visit http://www.dos.state.fl.us/).

Company: (Legal Registration)

Address:

City: State: Zip:

Telephone No.: FAX No.: Email:

Check box if your firm qualifies for MBE / SBE / WBE:

If a corporation, state the name of the President, Secretary and Resident Agent. If a partnership, state the names of all partners. If a trade name, state the names of the individuals who do business under the trade name.

Name	Title	Name	Title
Name	Title	Name	Title

ADDENDUM ACKNOWLEDGEMENT - Bidder acknowledges that the following addenda have been received and are included in the proposal:

Addendum No.	Date Issued	Addendum No.	Date Issued	Addendum No.	Date Issued

VARIANCES: If you take exception or have variances to any term, condition, specification, or requirement in this bid you must specify such variance in the space provided below or reference in the space provided below all variances contained on other pages within your bid. Additional pages may be attached if necessary. No variances will be deemed to be part of the bid submitted unless such is listed and contained in the space provided below. The City does not, by virtue of submitting a variance, necessarily accept any variances. If no statement is contained in the below space, it is hereby implied that your response is in full compliance with this competitive solicitation. If you do not have variances, simply mark N/A. **You must also click the "Take Exception" button.**

The below signatory affirms that he has or will obtain all required permits and licenses from the appropriate agencies, and that his firm is authorized to do business in the State of Florida. The below signatory agrees to furnish all labor, tools, material, equipment and supplies, and to sustain all the expense incurred in doing the work set forth in strict accordance with the bid plans and contract documents at the unit prices indicated if awarded a contract. The below signatory has not divulged to, discussed, or compared this bid with other bidders, and has not colluded with any other bidder or parties to this bid whatsoever. Furthermore, the undersigned guarantees the truth and accuracy of all statements and answers contained in this bid. The below signatory also hereby agrees, by virtue of submitting or attempting to submit a bid, that in no event shall the City's liability for bidder's direct, indirect, incidental, consequential, special or exemplary damages, expenses, or lost profits arising out of this competitive solicitation process, including but not limited to public advertisement, bid conferences, site visits, evaluations, oral presentations, or award proceedings exceed the amount of Five Hundred Dollars ($500.00). This limitation shall not apply to claims arising under any provision of indemnification or the City's protest ordinance contained in this competitive solicitation.

Submitted by:

Name (printed) Signature

Date Title

Revised 4/28/2020

BID NO. 12513-613
FORT LAUDERDALE EXECUTIVE AIRPORT TAXIWAY INTERSECTION IMPROVEMENTS
(P12455)

ADDENDUM NO. 1

ISSUED: April 26, 2021

This Addendum is to provide the following information. It is hereby made a part of the Plans and Specifications and shall be included with all contract documents.

Acknowledge receipt of this Addendum by inserting its number and date on the CITB Construction Bid Certification Page.

1. **REPLACE:** Special Conditions Page SC-7, Section 13 – Liquidated Damages, and Sample Contract Page, C-30, Article 16.1 [*in part*] – Liquidated Damages, with the attached. **The amount for Liquidated Damages has been changed from $250.00 to $1,000.00**. Changes are shown in **red/bold**.

2. **ADD:** Base Bid Line Item, No. 51, has been added.

   Base Bid – Construction Survey, Stakeout, and As-Built (S-103-5.1) – 1 lump sum.
   (See Bidsync for details)

3. **ADD** Section 015900, Construction Sign, to the General Requirements. (see attached).

All other terms, conditions, and specifications remain unchanged.

Maureen Lewis, MBA, CPPB
Senior Procurement Specialist

Company Name: _____
(please print)

Bidder's Signature: _____

Date: _____

11. PERFORMANCE AND PAYMENT BOND: 100%

Number of awards anticipated: 1

12. CITY PROJECT MANAGER

The Project Manager is hereby designated by the City as **Khant Myat, P.E.**, whose address is **100 North Andrews, 4th Floor, Fort Lauderdale, Florida 33301-1016**, telephone number: **(954) 828-5061**, and e-mail address is **kmyat@fortlauderdale.gov**. The Project Manager will assume all duties and responsibilities and will have the rights and authorities assigned to the Project Manager in the Contract Documents in connection with completion of the Work in accordance with this Agreement.

13. LIQUIDATED DAMAGES *(See Article 16, Liquidated Damages, of the Contract for details)*
Upon failure of the Contractor to complete the Work within the time specified for completion, the Contractor shall pay to the City the sum of **One Thousand Dollars ($1,000.00)** for each and every calendar day that the completion of the Work is delayed beyond the time specified in this Agreement for completion, as fixed and agreed liquidated damages and not as a penalty, so long as the delay is caused by the Contractor. (See Article 16, Liquidated Damages Clause, of the Contract for more details)

14. PAYMENT (*See Article 7, Payment, of the Contract for other details*)

Payment on this Contract will be made by check.

15. WORK SCHEDULE (including overtime hours):

Regular work hours: **8:00 am to 5:00 pm, Monday through Friday.**
City Inspector Hours: **8:00 am to 4:30 pm, Monday through Friday.**

Any inspection requested by the contractor outside those hours will be considered overtime to be paid by the Contractor.

16. INSPECTION OVERTIME COST: $100/hr.

contractors and subcontractors, Florida Power and Light Company, AT&T and Florida East Coast Railway, LLC.

15.5 Rights of Various Interests: Whenever work being done by City's forces or by other contractors is contiguous to or within the limits of work covered by this Agreement, the respective rights of the various interests involved shall be established by the Project Manager to secure the completion of the various portions of the Work in general harmony.

ARTICLE 16 – LIQUIDATED DAMAGES

16.1 **Upon failure of the Contractor to complete the Work within the time specified for completion, the Contractor shall pay to the City the sum of One Thousand Dollars ($1,000.00) for each and every calendar day that the completion of the Work is delayed beyond the time specified in this Agreement for completion, as fixed and agreed liquidated damages and not as a penalty, so long as the delay is caused by the Contractor. Should an act of God or the acts or omissions of the City, its agents or representatives, in derogation to the terms of this Agreement cause the delay, the Contractor shall not be responsible for the delay nor liquidated damages. Liquidated damages are fixed and agreed upon between the Parties, recognizing the impossibility of precisely ascertaining the amount of damages that will be sustained by the City as a consequence of such delay and both Parties desiring to obviate any question of dispute concerning the amount of damages and the cost and effect of the failure of the Contractor to complete the Work on time. Liquidated damages shall apply separately to each portion of the Work for which a time of completion is given. The City shall have the right to deduct from or retain any compensation which may be due or which may become due and payable to the Contractor the amount of liquidated damages, and if the amount retained by the City is insufficient to pay in full such liquidated damages, the Contractor shall pay all liquidated damages in full. The Contractor shall be responsible for reimbursing the City, in addition to liquidated damages or other damages for delay, for all costs of engineering, architectural fees, and inspection and other costs incurred in administering the construction of the Project beyond the completion date specified or beyond an approved extension of time granted to the Contractor whichever is later. Delays caused by or resulting from entities, contractors or subcontractors who are not affiliated with the Contractor shall not give rise to a claim by Contractor for damages for increase in material and/or labor costs. Such entities, contractors and subcontractors include, but are not limited to, the City's contractors and subcontractors, Florida Power and Light Company, AT&T, and Florida East Coast Railway, LLC.**

In addition, for work beyond the time (hour and minute) established for opening the taxiway/runway, following each closure of that taxiway/runway in accordance with the phasing plans, the City will charge the Contractor a rental fee for the Contractor's use of the taxiway/runway. The parties agree that the sum of **Five Hundred Dollars** (**$500)** for the first minute and **Fifty Dollars ($50)** for every minute thereafter shall be fixed as the rental rates for continuing a taxiway/runway closure beyond the time provided for opening the taxiway/runway during each phase of work that requires taxiway/runway closure.

SECTION 01590 – PROJECT SIGN

PART 1 GENERAL

Contractor, at contractor's expense, shall furnish and install a **4' x 8'** sign (with white painted posts) prior to start of construction. A sample sign template is below but is not specific to the project. The exact style and design of the sign will be provided by the CITY to the Contractor during the preconstruction meeting in PDF format.

See Page 2, "Construction Sign Request Form", for information on the sign for this Project.

END OF SECTION

Construction Sign Request Form

P12455

Title (Bold):

FXE TAXIWAY INTERSECTION IMPROVEMENTS

Title (Not Bold):

What's Happening?

The project will involve demolition of the existing taxiways, construction of new taxiways including paving, new Light Emitting Mode (LED) lights and guidance signs, pavement striping, and sodding.

Benefits:

Improvements to the airfield taxiway system and to conform to current Federal Aviation Administration (FAA) design criteria.

Number of Neighbors Benefitted: N/A

Cost: T.B.D

Month and Year of Expected Completion: 10/2021

Contractor: T.B.D

Phone: 954-828-8000

We're Working On:

New paving of taxiway and new edge lighting.

Project Manager Signature

Date

Senior Project Manager Signature

Date

Question and Answers for Bid #12513-613 - Fort Lauderdale Executive Airport Taxiway Intersection Improvements (P12455)

Overall Bid Questions

Question 1

What is the estimated budget for this project? **(Submitted: Apr 1, 2021 3:24:51 PM EDT)**

Answer

- $2,000,000 **(Answered: Apr 6, 2021 12:39:38 PM EDT)**

Question 2

Please indicate if there are any contamination sited in the vicinity of the work zone that will need to be considered during construction. **(Submitted: Apr 22, 2021 9:41:41 AM EDT)**

Answer

- Currently, there are no known contamination sites in the vicinity of the work zone. **(Answered: Apr 26, 2021 10:39:35 AM EDT)**

Question 3

Will the owner or the awards GC be responsible for the materials testing and inspections on this project? **(Submitted: Apr 29, 2021 9:59:03 AM EDT)**

Answer

- City will have independent CEI and Quality Assurance material testing for the project. However, the contractor will be required to perform testing of the material for Quality Assurance per specifications described in this bid packet. **(Answered: Apr 29, 2021 9:59:53 AM EDT)**

Question 4

Please advise if an allowance account is established and confirm the amount for the project bid item:

Item Number 12513-613-01-50 - MODIFY EXISTING AIRFIELD LIGHTING CONTROL SYSTEM, COMPLETE (L-109-5.2) - THIS IT. **(Submitted: May 12, 2021 2:16:11 PM EDT)**

Answer

- The information was inadvertently omitted. It should have read "MODIFY EXISTING AIRFIELD LIGHTING CONTROL SYSTEM, COMPLETE (L-109-5.2) - THIS ITEM SHALL NOT EXCEED $18,000."

Bid Line Item Title and Description have been updated accordingly. **(Answered: May 14, 2021 9:48:16 AM EDT)**