An architectural rendering of the Savannah Arena, a large brick building with a prominent arched roof. The arena is surrounded by a paved plaza with green lawn patches and young trees. A large crowd of people is depicted walking and gathering in the plaza. To the left, a smaller brick building is labeled "WATER WORKS PUMP HOUSE". The sky is overcast.

**CITY OF SAVANNAH, GEORGIA
PROPOSED ARENA FEASIBILITY STUDY
VOLUME II OF II (APPENDIX)**

**Prepared by:
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APPENDIX A: MARKET DEMOGRAPHICS

APPENDIX A: MARKET DEMOGRAPHICS

20 Mile Ring Designation Population and Households

Market	2015		2020		Est. %		2015		2020		Est. %	
	Population (000s)	Rank	Population (000s)	Rank	Growth 2015-2020	Rank	Households (000s)	Rank	Households (000s)	Rank	Growth 2015-2020	Rank
Trenton, NJ	1,646.1	1	1,668.3	1	1.35%	24	613.9	1	623.3	1	1.52%	23
Ann Arbor, MI	823.8	2	840.2	2	1.99%	18	326.7	2	333.9	2	2.22%	19
Canton-Massillon, OH	672.8	3	672.4	3	-0.06%	27	272.6	3	273.8	3	0.46%	27
Reading, PA	628.3	4	637.6	4	1.49%	22	233.4	5	236.6	6	1.39%	25
Manchester-Nashua, NH	610.7	5	616.5	5	0.95%	25	236.0	4	239.3	5	1.41%	24
Fort Collins, CO	572.1	6	613.5	6	7.23%	5	221.6	6	239.4	4	8.03%	3
Flint, MI	532.3	7	522.6	7	-1.81%	31	210.2	7	207.4	7	-1.33%	31
South Bend-Mishawaka, IN-MI	489.8	8	494.3	8	0.93%	26	187.1	8	189.1	8	1.08%	26
Mobile, AL	468.6	9	480.0	9	2.44%	17	182.7	9	187.8	9	2.75%	16
Fayetteville, NC	437.2	10	463.9	10	6.11%	6	167.4	10	178.8	11	6.78%	6
Salem, OR	424.8	11	441.6	11	3.94%	12	152.1	16	158.3	15	4.09%	12
Spartanburg, SC	419.6	12	441.1	12	5.13%	8	160.1	13	167.9	13	4.87%	10
Savannah, GA	410.7	13	440.6	13	7.28%	4	158.8	14	170.3	12	7.24%	5
Rockford, IL	409.8	14	405.4	16	-1.07%	30	156.7	15	155.1	17	-1.02%	30
Kalamazoo-Portage, MI	407.8	15	415.3	14	1.86%	20	163.5	12	167.1	14	2.22%	19
Naples-Immokalee et al, FL	380.1	16	409.5	15	7.74%	3	166.1	11	179.4	10	8.00%	4
Hickory-Lenoir-Morganton, NC	362.9	17	368.1	18	1.43%	23	143.3	18	145.7	19	1.72%	22
Ocala, FL	349.8	18	367.1	19	4.93%	9	148.1	17	155.8	16	5.20%	8
Davenport-Moline et al, IA-IL	347.5	19	354.3	20	1.94%	19	143.0	19	146.5	18	2.47%	18
Columbus, GA-AL	347.3	20	376.8	17	8.50%	2	133.6	22	145.6	20	8.97%	2
Peoria, IL	343.4	21	348.8	21	1.58%	21	138.4	21	141.0	22	1.91%	21
Eugene, OR	335.4	22	344.8	23	2.80%	16	138.9	20	143.8	21	3.49%	14
Tallahassee, FL	334.0	23	346.6	22	3.78%	13	132.0	23	137.2	23	3.91%	13
Montgomery, AL	333.9	24	332.3	26	-0.47%	29	127.2	24	126.9	25	-0.23%	29
Beaumont-Port Arthur, TX	330.6	25	340.6	24	3.02%	14	122.7	26	126.8	26	3.32%	15
Lincoln, NE	321.3	26	338.0	25	5.20%	7	127.2	25	134.1	24	5.47%	7
Anchorage, AK	298.9	27	311.9	27	4.33%	11	110.3	28	115.4	28	4.61%	11
Myrtle Beach-Conway et al, SC-NC	279.7	28	305.0	28	9.06%	1	115.9	27	126.5	27	9.11%	1
Huntington-Ashland, WV-KY-OH	265.8	29	265.1	30	-0.29%	28	110.0	29	109.9	29	-0.07%	28
Gulfport-Biloxi-Pascagoula, MS	265.1	30	277.4	29	4.61%	10	101.7	30	107.0	30	5.19%	9
Salisbury, MD-DE	176.2	31	181.2	31	2.83%	15	64.6	31	66.2	31	2.51%	17
Average (Ex. Savannah)	453.9		466.0		3.05%		176.9		182.2		3.34%	

Source: Claritas 2015.

APPENDIX A: MARKET DEMOGRAPHICS

20 Mile Ring Designation Income

Market	Average Household		Median Household		HHs w/ Income \$100,000+ (000s)	
	Income	Rank	Income	Rank		Rank
Anchorage, AK	\$100,264	1	\$78,244	1	41.6	6
Trenton, NJ	\$96,553	2	\$71,430	3	210.3	1
Manchester-Nashua, NH	\$92,170	3	\$73,974	2	80.7	3
Ann Arbor, MI	\$84,840	4	\$63,498	4	95.0	2
Naples-Immokalee et al, FL	\$84,602	5	\$56,357	7	41.0	7
Fort Collins, CO	\$74,095	6	\$57,099	6	52.1	5
Reading, PA	\$73,535	7	\$57,722	5	52.3	4
Peoria, IL	\$71,608	8	\$56,330	8	31.4	10
Lincoln, NE	\$71,476	9	\$53,905	9	27.0	15
Davenport-Moline et al, IA-IL	\$71,369	10	\$53,885	10	30.1	13
Savannah, GA	\$67,824	11	\$49,116	13	30.4	12
Tallahassee, FL	\$66,342	12	\$48,059	14	26.7	16
Rockford, IL	\$65,754	13	\$50,800	11	28.1	14
Salisbury, MD-DE	\$64,688	14	\$50,761	12	12.2	31
Montgomery, AL	\$62,918	15	\$47,629	15	22.4	22
Columbus, GA-AL	\$62,908	16	\$47,038	16	22.2	23
Beaumont-Port Arthur, TX	\$62,376	17	\$45,105	22	21.9	24
Mobile, AL	\$61,944	18	\$46,112	19	31.3	11
Kalamazoo-Portage, MI	\$59,926	19	\$44,966	23	25.3	18
Salem, OR	\$58,876	20	\$46,898	17	22.9	21
Flint, MI	\$58,696	21	\$45,207	21	32.4	9
Gulfport-Biloxi-Pascagoula, MS	\$58,660	22	\$43,400	27	14.7	28
Fayetteville, NC	\$58,624	23	\$46,647	18	24.2	20
South Bend-Mishawaka, IN-MI	\$58,293	24	\$44,698	24	25.9	17
Spartanburg, SC	\$58,202	25	\$43,865	25	24.4	19
Canton-Massillon, OH	\$58,044	26	\$45,650	20	38.9	8
Eugene, OR	\$57,496	27	\$43,573	26	20.7	25
Huntington-Ashland, WV-KY-OH	\$56,956	28	\$41,887	28	15.7	26
Myrtle Beach-Conway et al, SC-NC	\$53,780	29	\$40,547	29	13.2	30
Hickory-Lenoir-Morganton, NC	\$52,272	30	\$39,146	31	15.5	27
Ocala, FL	\$51,603	31	\$39,495	30	14.3	29
Average (Ex Savannah)	\$66,962		\$50,798		37.1	

Source: Claritas 2015.

APPENDIX A: MARKET DEMOGRAPHICS

20 Mile Ring Designation Age

Market	Average		Median	
	Age	Rank	Age	Rank
Fayetteville, NC	34.7	1	32.4	1
Anchorage, AK	35.5	2	33.8	4
Columbus, GA-AL	36.4	3	34.2	5
Lincoln, NE	36.5	4	33.7	3
Tallahassee, FL	36.6	5	32.7	2
Fort Collins, CO	37.2	6	35.1	6
Montgomery, AL	37.4	7	35.9	7
Gulfport-Biloxi-Pascagoula, MS	37.6	8	36.5	10
Salem, OR	37.9	9	36.3	9
Beaumont-Port Arthur, TX	37.9	9	36.5	10
Savannah, GA	38.1	11	36.2	8
Kalamazoo-Portage, MI	38.4	12	36.7	12
South Bend-Mishawaka, IN-MI	38.5	13	37.5	14
Ann Arbor, MI	38.7	14	38.1	16
Spartanburg, SC	38.7	14	38.5	17
Salisbury, MD-DE	38.7	14	37.0	13
Mobile, AL	38.8	17	38.0	15
Rockford, IL	39.0	18	38.7	20
Peoria, IL	39.4	19	38.6	18
Reading, PA	39.4	19	39.3	21
Davenport-Moline et al, IA-IL	39.7	21	39.4	22
Flint, MI	39.8	22	40.2	23
Eugene, OR	40.0	23	38.6	18
Manchester-Nashua, NH	40.1	24	41.2	27
Trenton, NJ	40.5	25	41.0	24
Hickory-Lenoir-Morganton, NC	40.6	26	41.4	28
Canton-Massillon, OH	40.8	27	41.1	26
Huntington-Ashland, WV-KY-OH	41.0	28	41.0	24
Myrtle Beach-Conway et al, SC-NC	41.6	29	42.1	29
Ocala, FL	47.1	30	50.5	30
Naples-Immokalee et al, FL	48.3	31	52.1	31
Average (Ex. Savannah)	39.2		38.6	

Source: Claritas 2015.

APPENDIX A: MARKET DEMOGRAPHICS

20 Mile Ring Designation Corporate Base

Market	Companies w/ \$20mm		Companies w/ 500+	
	Sales	Rank	Employees	Rank
Trenton, NJ	1,139	1	247	1
Ann Arbor, MI	717	2	98	2
Reading, PA	452	3	66	4
Manchester-Nashua, NH	379	4	65	5
Canton-Massillon, OH	347	5	71	3
South Bend-Mishawaka, IN-MI	254	6	33	13
Spartanburg, SC	245	7	57	6
Anchorage, AK	216	8	26	20
Mobile, AL	185	9	30	15
Rockford, IL	175	10	30	15
Hickory-Lenoir-Morganton, NC	162	11	23	21
Davenport-Moline et al, IA-IL	161	12	30	15
Kalamazoo-Portage, MI	156	13	39	8
Flint, MI	137	14	20	24
Savannah, GA	136	15	31	14
Peoria, IL	134	16	35	11
Eugene, OR	132	17	19	25
Lincoln, NE	132	17	34	12
Montgomery, AL	124	19	37	9
Salem, OR	101	20	29	18
Beaumont-Port Arthur, TX	98	21	23	21
Huntington-Ashland, WV-KY-OH	96	22	19	25
Fort Collins, CO	95	23	37	9
Naples-Immokalee et al, FL	93	24	14	29
Tallahassee, FL	88	25	47	7
Columbus, GA-AL	74	26	19	25
Ocala, FL	70	27	22	23
Gulfport-Biloxi-Pascagoula, MS	64	28	17	28
Fayetteville, NC	52	29	29	18
Myrtle Beach-Conway et al, SC-NC	51	30	13	30
Salisbury, MD-DE	45	31	6	31
Average (Ex. Savannah)	206		41	

Source: Hoovers 2015.

APPENDIX A: MARKET DEMOGRAPHICS

30 Mile Ring Designation Population and Households

Market	2015 Population		2020 Population		Est. % Growth		2015 Households		2020 Households		Est. % Growth	
	(000s)	Rank	(000s)	Rank	2015-2020	Rank	(000s)	Rank	(000s)	Rank	2015-2020	Rank
Trenton, NJ	4,704.5	1	4,785.5	1	1.72%	21	1,766.4	1	1,800.6	1	1.94%	21
Ann Arbor, MI	2,207.5	2	2,219.2	2	0.53%	26	873.1	2	882.2	2	1.05%	25
Reading, PA	1,644.8	3	1,678.5	3	2.05%	20	614.6	3	626.4	3	1.91%	22
Manchester-Nashua, NH	1,383.5	4	1,418.5	4	2.53%	18	520.9	4	535.7	4	2.84%	18
Canton-Massillon, OH	1,249.0	5	1,252.2	5	0.25%	27	503.7	5	507.5	5	0.75%	27
Flint, MI	989.1	6	989.1	6	0.00%	28	383.8	6	385.2	6	0.36%	28
Spartanburg, SC	915.0	7	960.1	7	4.93%	9	357.5	7	374.9	7	4.88%	10
South Bend-Mishawaka, IN-MI	747.4	8	753.4	10	0.81%	25	284.5	8	287.2	9	0.95%	26
Salem, OR	725.9	9	753.8	9	3.84%	11	267.8	10	278.8	10	4.10%	12
Fort Collins, CO	713.0	10	766.7	8	7.53%	4	274.7	9	297.2	8	8.17%	1
Rockford, IL	645.7	11	639.5	13	-0.96%	31	248.5	13	246.6	15	-0.76%	31
Fayetteville, NC	645.7	12	682.6	11	5.72%	6	244.5	15	259.8	13	6.29%	6
Hickory-Lenoir-Morganton, NC	639.4	13	654.6	12	2.38%	19	251.6	12	257.9	14	2.51%	19
Ocala, FL	578.7	14	608.5	14	5.16%	7	254.0	11	268.3	11	5.62%	7
Mobile, AL	573.5	15	588.7	16	2.65%	17	221.8	17	228.3	16	2.97%	17
Naples-Innokalee et al, FL	563.7	16	607.8	15	7.83%	2	247.4	14	267.2	12	8.01%	4
Kalamazoo-Portage, MI	557.6	17	564.7	17	1.28%	23	222.0	16	225.7	17	1.71%	23
Savannah, GA	505.5	18	541.1	18	7.05%	5	196.3	18	210.5	18	7.23%	5
Columbus, GA-AL	448.1	19	482.3	19	7.63%	3	173.6	20	187.7	19	8.13%	3
Davenport-Moline et al, IA-IL	442.5	20	448.9	20	1.44%	22	181.7	19	185.3	20	1.95%	20
Beaumont-Port Arthur, TX	408.6	21	420.1	21	2.83%	15	152.8	24	157.6	23	3.14%	16
Peoria, IL	402.9	22	407.6	22	1.16%	24	161.6	21	164.0	22	1.52%	24
Huntington-Ashland, WV-KY-OH	384.3	23	383.8	26	-0.13%	29	156.7	23	156.9	24	0.12%	29
Tallahassee, FL	379.5	24	392.3	24	3.39%	14	149.3	25	154.7	25	3.63%	14
Montgomery, AL	377.4	25	375.5	28	-0.51%	30	144.6	27	144.3	29	-0.18%	30
Myrtle Beach-Conway et al, SC-NC	377.4	26	407.2	23	7.89%	1	157.7	22	170.6	21	8.16%	2
Gulfport-Biloxi-Pascagoula, MS	375.9	27	389.9	25	3.74%	12	143.9	28	149.9	27	4.15%	11
Eugene, OR	360.4	28	370.2	29	2.70%	16	148.8	26	153.9	26	3.43%	15
Lincoln, NE	360.0	29	377.7	27	4.93%	9	142.1	29	149.5	28	5.18%	9
Anchorage, AK	340.0	30	357.2	30	5.05%	8	125.2	31	131.9	31	5.35%	8
Salisbury, MD-DE	339.9	31	352.3	31	3.67%	13	131.8	30	136.8	30	3.77%	13
Average (Ex. Savannah)	816.0		836.3		3.07%		316.9		325.8		3.39%	

Source: Claritas 2015.

APPENDIX A: MARKET DEMOGRAPHICS

30 Mile Ring Designation

Income

Market	Average Household		Median Household		HHs w/ Income \$100,000+	
	Income	Rank	Income	Rank	(000s)	Rank
Anchorage, AK	\$99,101	1	\$77,260	1	46.6	10
Manchester-Nashua, NH	\$92,603	2	\$72,664	2	177.3	3
Trenton, NJ	\$88,074	3	\$63,599	3	539.7	1
Reading, PA	\$81,238	4	\$62,368	4	162.9	4
Naples-Immokalee et al, FL	\$80,076	5	\$53,994	9	56.5	9
Fort Collins, CO	\$78,299	6	\$60,435	5	71.1	7
Ann Arbor, MI	\$74,025	7	\$55,417	7	204.3	2
Lincoln, NE	\$71,891	8	\$54,863	8	30.6	21
Peoria, IL	\$71,016	9	\$56,103	6	36.0	17
Savannah, GA	\$70,538	10	\$50,670	13	39.7	14
Davenport-Moline et al, IA-IL	\$69,720	11	\$53,372	10	36.9	15
Salisbury, MD-DE	\$67,728	12	\$52,820	11	26.1	26
Flint, MI	\$66,619	13	\$50,674	12	75.8	6
Tallahassee, FL	\$64,569	14	\$46,898	18	28.7	23
Rockford, IL	\$63,597	15	\$49,487	14	42.8	12
Beaumont-Port Arthur, TX	\$63,073	16	\$46,172	20	28.0	24
Columbus, GA-AL	\$63,034	17	\$46,684	19	29.6	22
Montgomery, AL	\$62,501	18	\$47,371	16	25.2	27
Mobile, AL	\$61,339	19	\$45,928	21	36.9	16
Canton-Massillon, OH	\$61,320	20	\$47,324	17	80.4	5
Salem, OR	\$61,114	21	\$47,784	15	44.7	11
Spartanburg, SC	\$60,454	22	\$44,217	24	58.4	8
South Bend-Mishawaka, IN-MI	\$59,503	23	\$45,907	22	41.1	13
Kalamazoo-Portage, MI	\$59,324	24	\$45,509	23	33.3	19
Hickory-Lenoir-Morganton, NC	\$58,979	25	\$42,943	28	35.2	18
Huntington-Ashland, WV-KY-OH	\$58,692	26	\$43,634	26	24.1	28
Gulfport-Biloxi-Pascagoula, MS	\$57,931	27	\$42,646	29	20.3	30
Eugene, OR	\$57,236	28	\$43,551	27	21.8	29
Fayetteville, NC	\$56,268	29	\$43,776	25	33.2	20
Myrtle Beach-Conway et al, SC-NC	\$54,335	30	\$40,625	31	19.0	31
Ocala, FL	\$52,918	31	\$40,743	30	27.2	25
Average (Ex. Savannah)	\$67,219		\$50,826		69.8	

Source: Claritas 2015.

APPENDIX A: MARKET DEMOGRAPHICS

30 Mile Ring Designation Age

Market	Average		Median	
	Age	Rank	Age	Rank
Fayetteville, NC	35.5	1	33.3	1
Anchorage, AK	35.5	1	33.9	3
Lincoln, NE	36.9	3	34.3	4
Columbus, GA-AL	37.0	4	35.1	5
Tallahassee, FL	37.0	4	33.4	2
Fort Collins, CO	37.5	6	36.1	6
Montgomery, AL	37.7	7	36.5	8
Gulfport-Biloxi-Pascagoula, MS	38.1	8	37.3	10
Salem, OR	38.2	9	36.4	7
Beaumont-Port Arthur, TX	38.2	9	37.0	9
Rockford, IL	38.7	11	37.9	12
Savannah, GA	38.8	12	37.3	10
Mobile, AL	38.8	12	38.1	14
South Bend-Mishawaka, IN-MI	38.8	12	38.1	14
Kalamazoo-Portage, MI	39.0	15	37.9	12
Spartanburg, SC	39.0	15	38.7	16
Trenton, NJ	39.3	17	38.7	16
Ann Arbor, MI	39.4	18	39.2	20
Manchester-Nashua, NH	39.5	19	40.1	23
Peoria, IL	39.6	20	39.1	18
Reading, PA	39.6	20	39.7	21
Flint, MI	39.7	22	40.5	25
Davenport-Moline et al, IA-IL	39.9	23	39.7	21
Eugene, OR	40.2	24	39.1	18
Canton-Massillon, OH	40.4	25	40.2	24
Hickory-Lenoir-Morganton, NC	40.7	26	41.7	27
Huntington-Ashland, WV-KY-OH	40.8	27	41.1	26
Salisbury, MD-DE	41.3	28	41.8	28
Myrtle Beach-Conway et al, SC-NC	42.9	29	44.2	29
Naples-Immokalee et al, FL	48.2	30	51.9	30
Ocala, FL	49.1	31	54.4	31
Average (Ex. Savannah)	39.6		39.2	

Source: Claritas 2015.

APPENDIX A: MARKET DEMOGRAPHICS

30 Mile Ring Designation Corporate Base

Market	Companies w/ \$20mm		Companies w/ 500+	
	Sales	Rank	Employees	Rank
Trenton, NJ	2,958	1	681	1
Ann Arbor, MI	1,677	2	273	2
Reading, PA	1,391	3	231	3
Manchester-Nashua, NH	819	4	142	4
Canton-Massillon, OH	616	5	128	5
Flint, MI	555	6	91	7
Spartanburg, SC	455	7	98	6
South Bend-Mishawaka, IN-MI	377	8	55	10
Hickory-Lenoir-Morganton, NC	311	9	60	8
Rockford, IL	299	10	54	11
Salem, OR	277	11	58	9
Anchorage, AK	227	12	29	24
Mobile, AL	215	13	35	22
Davenport-Moline et al, IA-IL	209	14	36	21
Kalamazoo-Portage, MI	206	15	45	14
Fort Collins, CO	181	16	53	12
Lincoln, NE	173	17	40	15
Savannah, GA	165	18	37	18
Naples-Immokalee et al, FL	157	19	27	26
Peoria, IL	142	20	37	18
Eugene, OR	134	21	20	30
Montgomery, AL	134	21	38	16
Ocala, FL	127	23	38	16
Beaumont-Port Arthur, TX	119	24	30	23
Huntington-Ashland, WV-KY-OH	118	25	26	27
Columbus, GA-AL	115	26	28	25
Tallahassee, FL	112	27	51	13
Fayetteville, NC	107	28	37	18
Salisbury, MD-DE	101	29	11	31
Gulfport-Biloxi-Pascagoula, MS	90	30	25	28
Myrtle Beach-Conway et al, SC-NC	71	31	21	29
Average (Ex. Savannah)	416		83	

Source: Hoovers 2015.

APPENDIX A: MARKET DEMOGRAPHICS

30 Minute Drive Time Designation Population and Households

Market	2015		2020		Est. %		2015		2020		Est. %	
	Population (000s)	Rank	Population (000s)	Rank	2015-2020 Growth	Rank	Households (000s)	Rank	Households (000s)	Rank	2015-2020 Growth	Rank
Trenton, NJ	1,633.6	1	1,655.5	1	1.34%	24	610.7	1	620.1	1	1.54%	24
Ann Arbor, MI	810.9	2	826.0	2	1.87%	20	320.0	3	326.8	3	2.13%	20
Canton-Massillon, OH	795.5	3	795.0	3	-0.06%	28	328.0	2	329.6	2	0.48%	27
Manchester-Nashua, NH	675.7	4	686.3	4	1.57%	22	259.6	4	264.6	4	1.96%	21
Flint, MI	525.5	5	516.3	6	-1.75%	31	207.9	5	205.3	5	-1.28%	30
Reading, PA	512.5	6	519.1	5	1.30%	25	190.4	6	192.6	7	1.16%	25
Spartanburg, SC	474.1	7	498.6	7	5.17%	8	186.6	7	195.9	6	5.01%	9
Mobile, AL	459.5	8	470.4	9	2.36%	17	179.5	8	184.3	9	2.68%	17
Fort Collins, CO	454.8	9	492.1	8	8.22%	3	176.5	9	191.8	8	8.66%	3
South Bend-Mishawaka, IN-MI	431.1	10	434.4	10	0.78%	26	165.8	10	167.4	10	0.95%	26
Salem, OR	413.5	11	429.8	11	3.94%	12	150.3	13	156.4	13	4.08%	12
Fayetteville, NC	403.2	12	425.8	12	5.60%	6	156.1	12	166.1	11	6.37%	6
Kalamazoo-Portage, MI	400.8	13	408.4	13	1.88%	19	161.1	11	164.7	12	2.23%	19
Hickory-Lenoir-Morganton, NC	352.2	14	357.1	16	1.38%	23	139.7	15	142.2	17	1.73%	23
Savannah, GA	348.6	15	371.5	14	6.56%	5	134.2	19	143.1	16	6.63%	5
Beaumont-Port Arthur, TX	345.4	16	355.0	17	2.77%	16	128.7	20	132.6	21	3.03%	15
Davenport-Moline et al, IA-IL	343.9	17	350.9	18	2.03%	18	141.7	14	145.3	15	2.56%	18
Rockford, IL	334.4	18	329.6	22	-1.45%	30	128.5	21	126.7	24	-1.43%	31
Peoria, IL	333.7	19	339.1	20	1.63%	21	134.5	18	137.1	20	1.95%	22
Columbus, GA-AL	333.5	20	362.1	15	8.58%	2	128.4	22	140.0	18	9.06%	2
Eugene, OR	324.9	21	334.1	21	2.83%	15	134.7	17	139.4	19	3.51%	14
Naples-Innokalee et al, FL	316.4	22	339.6	19	7.34%	4	139.2	16	150.1	14	7.78%	4
Lincoln, NE	305.2	23	321.2	23	5.24%	7	121.6	24	128.3	22	5.52%	7
Montgomery, AL	303.4	24	301.5	27	-0.64%	29	117.1	26	116.6	26	-0.41%	29
Anchorage, AK	300.0	25	313.0	24	4.32%	11	110.6	27	115.6	27	4.59%	10
Tallahassee, FL	298.7	26	310.4	26	3.91%	13	120.0	25	124.9	25	4.08%	12
Ocala, FL	298.2	27	311.3	25	4.41%	10	122.9	23	128.3	23	4.34%	11
Myrtle Beach-Conway et al, SC-NC	240.9	28	263.5	28	9.38%	1	99.6	28	109.0	28	9.39%	1
Gulfport-Biloxi-Pascagoula, MS	221.6	29	232.1	29	4.72%	9	85.9	29	90.5	29	5.29%	8
Huntington-Ashland, WV-KY-OH	200.3	30	200.7	30	0.20%	27	83.8	30	84.2	30	0.42%	28
Salisbury, MD-DE	138.1	31	142.5	31	3.18%	14	50.2	31	51.7	31	2.97%	16
Average (Ex Savannah)	432.7		444.0		3.07%		169.3		174.3		3.35%	

Source: Claritas 2015.

APPENDIX A: MARKET DEMOGRAPHICS

30 Minute Drive Time Designation

Income

Market	Average Household		Median Household		HHs w/ Income \$100,000+	
	Income	Rank	Income	Rank	(000s)	Rank
Anchorage, AK	\$100,309	1	\$78,361	1	41.8	6
Trenton, NJ	\$95,084	2	\$70,461	3	205.9	1
Manchester-Nashua, NH	\$90,954	3	\$72,070	2	86.8	3
Ann Arbor, MI	\$86,031	4	\$65,203	4	95.7	2
Naples-Immokalee et al, FL	\$83,579	5	\$54,853	8	33.6	8
Fort Collins, CO	\$78,581	6	\$62,044	5	45.9	4
Peoria, IL	\$71,596	7	\$56,145	6	30.6	11
Reading, PA	\$71,347	8	\$55,324	7	40.3	7
Lincoln, NE	\$71,253	9	\$53,577	10	25.7	14
Davenport-Moline et al, IA-IL	\$71,168	10	\$53,638	9	29.8	13
Tallahassee, FL	\$66,985	11	\$48,088	13	24.6	16
Rockford, IL	\$66,449	12	\$51,663	11	23.6	17
Salisbury, MD-DE	\$65,223	13	\$51,037	12	9.7	31
Savannah, GA	\$63,734	14	\$46,580	16	23.4	18
Montgomery, AL	\$62,601	15	\$47,191	14	20.4	24
Columbus, GA-AL	\$62,164	16	\$46,609	15	20.8	23
Beaumont-Port Arthur, TX	\$61,951	17	\$44,946	22	22.6	20
Mobile, AL	\$61,767	18	\$45,898	18	30.5	12
Spartanburg, SC	\$60,898	19	\$44,955	21	30.8	10
Kalamazoo-Portage, MI	\$59,604	20	\$44,400	24	24.9	15
Huntington-Ashland, WV-KY-OH	\$59,373	21	\$43,309	26	12.9	27
Flint, MI	\$59,043	22	\$45,122	20	32.5	9
Fayetteville, NC	\$58,624	23	\$46,423	17	22.4	21
South Bend-Mishawaka, IN-MI	\$58,422	24	\$44,344	25	23.4	19
Gulfport-Biloxi-Pascagoula, MS	\$58,238	25	\$42,639	28	12.1	28
Eugene, OR	\$57,292	26	\$43,243	27	20.0	25
Canton-Massillon, OH	\$57,175	27	\$44,470	23	45.6	5
Salem, OR	\$56,904	28	\$45,383	19	20.8	22
Myrtle Beach-Conway et al, SC-NC	\$53,909	29	\$40,910	29	11.4	30
Hickory-Lenoir-Morganton, NC	\$53,216	30	\$39,883	30	15.7	26
Ocala, FL	\$51,438	31	\$39,086	31	12.0	29
Average (Ex. Savannah)	\$67,039		\$50,709		35.7	

Source: Claritas 2015.

APPENDIX A: MARKET DEMOGRAPHICS

30 Minute Drive Time Designation

Age

Market	Average		Median	
	Age	Rank	Age	Rank
Fayetteville, NC	35.0	1	32.6	2
Anchorage, AK	35.5	2	33.9	4
Columbus, GA-AL	36.2	3	34.0	5
Tallahassee, FL	36.2	3	31.9	1
Lincoln, NE	36.5	5	33.7	3
Montgomery, AL	37.2	6	35.7	8
Fort Collins, CO	37.3	7	35.6	7
Savannah, GA	37.3	7	34.9	6
Gulfport-Biloxi-Pascagoula, MS	37.7	9	36.3	11
Salem, OR	37.7	9	35.8	10
Salisbury, MD-DE	38.0	11	35.7	8
Beaumont-Port Arthur, TX	38.1	12	36.6	13
Kalamazoo-Portage, MI	38.3	13	36.5	12
South Bend-Mishawaka, IN-MI	38.5	14	37.4	14
Mobile, AL	38.7	15	37.9	15
Ann Arbor, MI	38.9	16	38.3	17
Rockford, IL	39.0	17	38.7	20
Spartanburg, SC	39.0	17	38.5	18
Reading, PA	39.2	19	38.8	21
Peoria, IL	39.3	20	38.5	18
Davenport-Moline et al, IA-IL	39.7	21	39.3	22
Manchester-Nashua, NH	39.8	22	40.5	25
Flint, MI	39.8	22	40.2	23
Eugene, OR	39.8	22	38.2	16
Trenton, NJ	40.4	25	40.7	26
Hickory-Lenoir-Morganton, NC	40.6	26	41.1	28
Canton-Massillon, OH	40.7	27	40.7	26
Huntington-Ashland, WV-KY-OH	40.7	27	40.4	24
Myrtle Beach-Conway et al, SC-NC	41.2	29	41.3	29
Ocala, FL	45.4	30	47.6	30
Naples-Immokalee et al, FL	48.1	31	51.6	31
Average (Ex. Savannah)	39.1		38.3	

Source: Claritas 2015.

APPENDIX B: DEVELOPMENT CASE STUDIES

APPENDIX B: DEVELOPMENT CASE STUDIES

Huntington Center Toledo, OH

Huntington Center, built in 2009, has seating for approximately 7,389 and includes 20 luxury suites, and 750 club seats. The arena hosts the ECHL hockey Toledo Walleye, concerts, and family shows, among others. The facility is owned by Lucas County and operated by SMG. The arena is located in close proximity to the minor league ballpark, Fifth Third Field, and the Seagate Convention Centre.

Arena:	Huntington Center
Year Open/Renovated:	2009
Arena Owner:	Lucas County
Total Cost:	See Sources/Uses Schedule
Public Investment:	See Sources/Uses Schedule
Private Investment:	See Sources/Uses Schedule
Cost Overrun Responsibility:	To be Confirmed
New Construction/Renovation:	New Construction

Contractor:	Lanthrop
Architect:	HNTB
Management:	SMG
Concessionaire:	To be Confirmed
Total Seating Capacity:	7,389
Luxury Suites:	20
Club Seats:	750
Controlled Parking:	Not Available

APPENDIX B: DEVELOPMENT CASE STUDIES

Huntington Center Toledo, OH



■ Project Funding

- Debt is serviced by:
 - Existing hotel occupancy tax
 - 2.0% increase hotel occupancy tax
 - County general obligation debt
 - Net arena revenues

Sources of Funds

Taxable Financing Proceeds	\$38,900,000
Tax-Exempt Financing Proceeds	\$46,000,000
Cash Contribution	\$1,600,000
Investment Income	\$2,750,000
Private Contribution	\$3,650,000
TARTA	\$2,000,000
OLFC	<u>\$13,700,000</u>

Total Sources of Funds \$108,600,000

Uses of Funds - Estimated

Arena Project	\$98,500,000
Site Preparation	\$2,800,000
Soft Costs	\$1,700,000
Owners Contingency	<u>\$5,600,000</u>

Total Uses of Funds \$108,600,000

APPENDIX B: DEVELOPMENT CASE STUDIES

U.S Cellular Coliseum Bloomington, IL

US Cellular Coliseum, located in Bloomington, Illinois, opened in 2006. The arena has a hockey seating capacity of approximately 6,600. There are 24 luxury suites, 2 party suites, and 800 club seats at the facility. US Cellular Coliseum is home to the Bloomington Thunder (USHL) and the Bloomington Edge (CIF). The arena is owned by the City of Bloomington and operated by Central Illinois Arena Management, LLC.

Arena:	U.S. Cellular Coliseum
Year Open/Renovated:	2006
Arena Owner:	City of Bloomington
Total Cost:	See Sources/Uses Schedule
Public Investment:	See Sources/Uses Schedule
Private Investment:	See Sources/Uses Schedule
Cost Overrun Responsibility:	To be Confirmed
New Construction/Renovation:	New Construction

Contractor:	To be Confirmed
Architect:	To be Confirmed
Management:	Central Illinois Arena Management, LLC
Concessionaire:	To be Confirmed
Total Seating Capacity:	6,600
Luxury Suites:	24 (plus 2 party suites)
Club Seats:	800
Controlled Parking:	Not Available

APPENDIX B: DEVELOPMENT CASE STUDIES

U.S Cellular Coliseum Bloomington, IL



Sources of Funds

City of Bloomington	<u>\$37,000,000</u>
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Total Sources of Funds

	\$37,000,000
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Uses of Funds - Estimated

Main Arena	\$27,500,000
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Ice Rink	\$5,000,000
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Parking Structure	\$3,750,000
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Rounding	<u>\$750,000</u>
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Total Uses of Funds

	\$37,000,000
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Note: Does not include land or infrastructure.

■ Project Funding

- City of Bloomington increased sales tax by 0.25% to fund the project
 - Referendum was not required

APPENDIX B: DEVELOPMENT CASE STUDIES

Santa Ana Star Center Rio Rancho, NM

Construction was completed in late October 2006 on the Santa Ana Star Center. The facility includes approximately 6,000 fixed seats and can be expanded to approximately 8,000 seats. There are approximately 26 luxury suites and 500 club seats. The arena has hosted minor league hockey teams and is currently home to the New Mexico Stars (AIF). The arena provides usage to the New Mexico Activities Association, and a variety of other sporting events, family shows, and concerts. The arena is owned by the City of Rio Rancho and managed by Spectra.

Arena:	Santa Ana Star Center
Year Open/Renovated:	2006
Arena Owner:	City of Rio Rancho
Total Cost:	See Sources/Uses Schedule
Public Investment:	See Sources/Uses Schedule
Private Investment:	See Sources/Uses Schedule
Cost Overrun Responsibility:	To Be Confirmed
New Construction/Renovation:	New Construction

Contractor:	Bradbury Stamm/ Hunt Construction
Architect:	Sink Combs Dethelfs
Management:	Spectra
Concessionaire:	Boston Culinary
Total Seating Capacity:	8,000
Luxury Suites:	26
Club Seats:	500
Controlled Parking:	2,000

APPENDIX B: DEVELOPMENT CASE STUDIES

Santa Ana Star Center Rio Rancho, NM



■ Project Funding

- Debt is serviced by:
 - 10.0% surcharge (12% total) on all tickets, goods, and services at the arena
 - Net arena revenues
 - A limited gross receipt tax pledge of city against any possible debt service shortfalls

Sources of Funds

Taxable Bonds Series 2005	\$34,540,000
Sandoval County Contribution	<u>\$8,000,000</u>

Total Sources of Funds

\$42,540,000

Uses of Funds

Costs of Issuance	\$125,000
Deposit to Debt Service Reserve Fund	\$2,892,403
Deposit to Capitalized Interest Fund	\$3,566,469
Arena Construction	\$35,952,446
Rounding	<u>\$3,682</u>

Total Uses of Funds

\$42,540,000

APPENDIX B: DEVELOPMENT CASE STUDIES

Broadmoor World Arena Colorado Springs, CO

Broadmoor World Arena, located in Colorado Springs, Colorado, opened in 1998. The arena has a maximum seating capacity of approximately 9,400. There are no luxury suites at the facility, but there are approximately 298 club seats. World Arena is home to the Colorado College men's hockey team, family shows, concerts, and numerous other special events, among others. World Arena was partially funded by the El Pomar Foundation.

Arena:	World Arena
Year Open/Renovated:	1998
Arena Owner:	World Arena (Non-Profit)
Total Cost:	See Sources/Uses Schedule
Public Investment:	See Sources/Uses Schedule
Private Investment:	See Sources/Uses Schedule
Cost Overrun Responsibility:	To Be Confirmed
New Construction/Renovation:	New Construction

Contractor:	CTL Thompson
Architect:	James W. Nakai & Associates PC
Management:	AEG
Concessionaire:	Centerplate
Total Seating Capacity:	9,400
Luxury Suites:	0
Club Seats:	298
Controlled Parking:	Not Available

APPENDIX B: DEVELOPMENT CASE STUDIES

Broadmoor World Arena Colorado Springs, CO



■ Project Funding

- Industrial revenue bonds were issued as construction loan, but repaid through funding sources detailed above

Sources of Funds	
El Pomar Foundation	\$31,000,000
City of Colorado Springs	\$7,000,000
Local Businesses/Individuals	\$6,500,000
Land Donation	\$3,300,000
El Paso County	\$3,000,000
Other Foundations	\$1,500,000
Colorado College	\$1,500,000
The Gazette	\$1,000,000
Interest Earnings	\$750,000
Individual Donation (Largest)	\$600,000
School District "Loan"	\$450,000
Arbitrage	\$300,000
Sale of a Land Parcel Proceeds	\$200,000
Operations Reserve Transferred to Construction	\$100,000
Total Sources of Funds	\$57,200,000
Uses of Funds	
Ice Hall	\$11,900,000
Land	\$1,100,000
Site Preparation	\$2,900,000
Furniture, Fixtures, and Equipment	\$200,000
Building	\$7,700,000
Offsite Improvements	\$4,500,000
Road	\$3,500,000
Drainage	\$1,000,000
Arena	\$38,700,000
Building	\$29,200,000
Furniture, Fixtures, and Equipment	\$1,700,000
Site-Work	\$4,800,000
Land	\$3,000,000
Miscellaneous	\$2,100,000
Carry/Finance	\$1,200,000
Administrative	\$400,000
Start-Up	\$500,000
Total Uses of Funds	\$57,200,000

APPENDIX B: DEVELOPMENT CASE STUDIES

Bon Secours Wellness Arena Greenville, SC

Bon Secours Wellness Arena, located in Greenville, South Carolina opened in 1998. The facility has a maximum seating capacity of approximately 13,707, including 30 luxury suites, and 840 club seats. The arena is home to the ECHL Greenville Swamp Rabbits and other athletic events, concerts, and family shows, among others. Bon Secours Wellness Arena was funded by a public/private partnership agreement. The facility is included as a case study because of its unique financing structure. Prior to the undertaking of the project, the City of Greenville had been debating the development of a new arena/public assembly facility for reportedly 25 years. The Greenville Memorial Auditorium District (now the Greenville Arena District) owned a site for a facility, owned and operated, at a loss, an existing, yet outdated venue, and had accumulated over \$1.0 million cash for a new building. The City and business community were both motivated by downtown development objectives, and were strong supporters of the arena project. The County of Greenville was reportedly a reluctant partner.

Arena:	Bon Secours Wellness Arena
Year Open/Renovated:	1998
Arena Owner:	Greenville Arena District
Total Cost:	See Sources/Uses Schedule
Public Investment:	See Sources/Uses Schedule
Private Investment:	See Sources/Uses Schedule
Cost Overrun Responsibility:	To Be Confirmed
New Construction/Renovation:	New Construction

Contractor:	Flour Daniel, Inc
Architect:	Odell Associates and AMI Architects
Management:	Greenville Arena District
Concessionaire:	Centerplate
Total Seating Capacity:	13,707
Luxury Suites:	30
Club Seats:	840
Controlled Parking:	Not Available

APPENDIX B: DEVELOPMENT CASE STUDIES

Bon Secours Wellness Arena Greenville, SC



Sources of Funds

Series 1996A G.O. Bonds	\$12,000,000
Series 1996B Accommodation Fee Bonds	\$19,160,000
Series 1996C Taxable Project Revenue Bond	\$19,390,000
Series 1996B Subordinated Bond	\$1,500,000
Series 1996 Taxable Completion Bonds	\$2,300,000
District Cash	\$1,800,000
City Cash	\$650,000
State Cash	\$2,500,000
Accommodation Fee Collections	\$600,000
Vendor Contribution	\$1,600,000
Utility Cash	\$100,000
Investment Income	\$2,260,000

Total Sources of Funds \$63,860,000

Uses of Funds

Project Funds (Construction)	\$57,400,000
Capitalized Interest (Series 1996C)	\$2,750,000
Bond Insurance (Series 1996B)	\$540,000
Costs of Issuance	\$1,000,000
Bond Underwriting	\$760,000
Upfront and Capitalized LOC Costs	\$1,410,000

Total Uses of Funds \$63,860,000

APPENDIX B: DEVELOPMENT CASE STUDIES

Maverik Center

West Valley City, UT

Maverik Center, built in 1997, has seating for approximately 10,400, with expansion up to 12,000, and includes 40 luxury suites, 1,750 club seats, and 3,000 parking stalls. Of the 40 luxury suites, 20 are located on the club seat/luxury suite level with the other 20 on the concourse level. The design of the arena affords for the construction of an additional 12 luxury suites and approximately 500 additional club seats. The arena hosts the ECHL hockey Utah Grizzlies, concerts, and family shows, among others. The facility also was the host venue for the Ice Hockey Championships at the 2002 Olympic Winter Games.

Arena:	Maverik Center
Year Open/Renovated:	1997
Arena Owner:	West Valley City
Total Cost:	See Sources/Uses Schedule
Public Investment:	See Sources/Uses Schedule
Private Investment:	See Sources/Uses Schedule
Cost Overrun Responsibility:	Public Sector
New Construction/Renovation:	New Construction

Contractor:	Turner Construction Company
Architect:	HOK Sport+Venue+Event
Management:	Centennial Management Group, Inc.
Concessionaire:	Not Available
Total Seating Capacity:	10,400 (Expansion to 12,000)
Luxury Suites:	40
Club Seats:	1,750
Controlled Parking:	3,000

APPENDIX B: DEVELOPMENT CASE STUDIES

Maverik Center

West Valley City, UT



Sources of Funds

Series 1996A Bond Proceeds	\$33,689,734
Series 1996B Bond Proceeds	\$7,150,000
City Contributions	\$7,500,000
State Contributions	\$1,900,000
Special Improvement District Bond Proceeds	\$1,500,000
Redevelopment Agency Bond Proceeds	\$5,825,000
Projected Interest Earnings on Construction Fund	\$642,650

Total Sources of Funds

\$58,207,384

Uses of Funds

Construction Contract Guaranteed Maximum Price	\$37,786,372
Development Testing	\$2,522,468
Site Work and Related Expenses	\$1,261,145
Road Improvements	\$1,500,000
Parking Lot	\$1,500,000
Furniture, Fixtures, and Equipment	\$554,000
Land Acquisition	\$4,259,316
Debt Service Reserve Funds	\$4,130,000
Capitalized Interest (1)	\$2,794,256
Bond Insurance Premium	\$1,025,421
Issuance Costs (2)	\$874,405

Total Uses of Funds

\$58,207,384

(1) Interest capitalized through November 1, 1997.

(2) Includes underwriters' discount, printing, mailing, and other miscellaneous costs and trustee, financial advisor, legal, and rating agency fees for the Series 1996A and 1996B Bonds.

Sources: Municipal Building Authority of West Valley City and West Valley City.

APPENDIX B: DEVELOPMENT CASE STUDIES

Maverik Center

West Valley City, UT

- **Repayment Sources**
 - **Annual city lease payments**
 - Per-ticket business license fee (\$1.00)
 - Per-vehicle business license fee (\$1.00)
 - Parking revenues
 - Revenues generated by city's existing hotel business licensing gross revenue fee
 - Private donations
 - Funds received from the Salt Lake Olympic Organizing Committee (SLOOC)
 - Naming rights revenues (if any)
 - Funds contributed or fees waved by salt lake county or other governmental entities
 - Funds appropriated by the Utah state legislature
 - Any fee, tax, charge, or imposition levied by the city on tickets, parking, admission to or use of the arena in excess of current charges
 - Funds generated by the sale of redevelopment agency bonds (applied toward land acquisition costs and construction of parking facilities)
 - **Debt service on bond**
 - Net proceeds from the naming rights
 - \$7,000,000 payment from SLOOC

APPENDIX C: PROJECT
SUMMARY
WORKSHEETS:
COST ESTIMATES

NEW ARENA COST ESTIMATE

Savannah Arena
Savannah, GA
February 12, 2016

Concept Estimate

Total Project Summary Worksheet

Description	Area	Cost	Cost/SF
Total Construction Cost	294,438 SF	\$102,269,142	\$347

The following items are those normally provided by the owner during the course of the project. These costs are not included in the construction estimate.

Off-site Improvements		\$9,000,000	
Site Reclamation Cost		\$720,000	
Special Assessments or Development Fees		Included below	
Site Survey		Included below	
Soil Borings and Report		Included below	
Architect and Engineer's Fees		Included below	
Drawing Reproduction Costs		Included below	
Testing and Inspections		Included below	
Furnishings Fixtures & Equipment (FF&E)		Included below	
Basketball Court / Goals		Included below	
Artwork		Included below	
Telephone System		Included below	
Moving Expenses		Included below	
Financing Costs		NA	
Legal Fees		Included below	
Owner Soft Cost Allowance	25%	\$27,997,285	
Owner's Contingency		Included Above	
Total Project Cost		\$139,986,427	

Savannah Arena
Savannah, GA
February 12, 2016

Concept Estimate

Construction Cost Summary

<i>Description</i>	<i>Quantity</i>	<i>Cost</i>	<i>Unit Cost</i>
Offsite Improvements			
		By Others	
Sitework	15.8 ACRES	8,416,320	532,678
New Arena	294,438 SF	80,911,441	275
Construction Subtotal	294,438 SF	89,327,761	\$303.54
Design Fees & Reimbursables	0%	0	0.00
Design & Estimating Contingency	5%	4,468,709	15.18
Construction Contingency	3%	2,681,225	9.11
Escalation to 2nd Qtr 2017	6%	5,791,447	19.67
Accepted Alternates		0	
Gross Receipts Taxes	0.00%	0	
Total Construction Cost	294,438 SF	\$102,269,142	\$347.49

Savannah Arena
Savannah, GA
February 12, 2016

Concept Estimate

New Arena
294,438 SF

<i>Item</i>	<i>Description</i>	<i>Cost</i>	<i>Cost/SF</i>
1	General Requirements	5,016,509	17.04
2	Demolition	0	0.00
3	Excavation	1,846,934	6.27
4	Structure	19,322,101	65.62
5	Enclosure	2,531,346	8.60
6	Rough Carpentry	139,611	0.47
7	Finish Carpentry	839,994	2.85
8	Roofing and Sheet Metal	2,095,157	7.12
9	Thermal and Moisture Protection	378,767	1.29
10	Doors and Hardware	695,285	2.36
11	Glass and Glazing	5,196,070	17.65
12	Interior Partitions	3,617,682	12.29
13	Stone and Tile	524,469	1.78
14	Ceilings and Acoustic	1,453,105	4.94
15	Flooring	1,670,007	5.67
16	Painting	458,757	1.56
17	Specialties	1,209,639	4.11
18	Equipment and Furnishings	3,604,737	12.24
19	Special Construction	1,550,000	5.26
20	Elevators	1,014,129	3.44
21	Fire Protection	662,555	2.25
22	Plumbing	2,326,238	7.90
23	HVAC Systems	8,224,323	27.93
24	Electrical	9,857,504	33.48
	Subtotal	74,234,919	252.12
	Permits, Bonds and Insurance	3,940,387	13.38
	Contingency	0	0.00
	Escalation or Other	0	0.00
	Fee	2,736,136	9.29
	Total	\$80,911,441	\$274.80
	Seats	8,655	\$9,349

Skin/Floor Area Ratio 26%
Glass/Skin Area Ratio 45%

Total Skin Cost, Contact Area \$90.16 /SF
Skin Cost, Bldg Area \$26.24 /SF

Item	Description	Unit	Quantity	Price	Amount	Cost/SF	Note
2	Demolition						
	Total				0	\$0.00	
3	Excavation						
31 20 00	Machine Excavation	CY	80,912	2.75	222,807	4.3' Avg	50 CY/HR
31 20 00	Place Surplus on Site	CY	82,549	3.18	262,473		50 CY/HR
31 60 00	Augercast Piles, 16"Ø	LF	39,529	22.63	894,662	700 psf Skin Friction	
31 20 00	Haul Pier Spoils	CY	2,065	11.96	24,695		10 CY/HR
31 20 00	Grade Beam & Ftg Excavate	CY	2,535	11.28	28,596	0% Rock	
31 20 00	3/4" Clean Crushed Rock at SOG	CY	5,546	48.30	267,855	12" Thick	
31 20 00	Compacted Earth Backfill	CY	898	8.29	7,446		
31 20 00	Granular Rock Backfill	CY	898	18.64	16,747	50% of Backfill	
03 31 00	Hand Grade and Pump Water	SF	149,743	0.39	58,403		
03 31 00	Utility Loader & Operator	WK	11.98	3,437	41,176		
03 31 00	Perimeter Foundation Drains	LF	208	6.02	1,251	None@SOG	
31 31 00	Soil Poisoning	SF	166,103	0.08	14,041		
31 20 00	Finish Grading	SF	61,560	0.11	6,781	1,500 SF/HR	
	Total				1,846,934	\$6.27	
4	Structure						
03 31 00	Pile Caps	CY	1,514	393.48	595,561	115 #/CY	4.0' Thick
03 31 00	Anchor Bolts & Grout Base Plates	EA	120	155.26	18,631		
03 31 00	Continuous Wall Footings	CY	42	521.34	22,090	100 #/CY	5.0' Wide
03 31 00	Grade Beams; 2' x 2'	CY	222	492.41	109,381	100 #/CY	Form 100%
03 31 00	Elevator Pit and Dock Walls	SF	1,600	30.22	48,346	150 #/CY	8" Thick
03 31 00	Foundation Walls & Pilasters	SF	4,680	29.59	138,464	130 #/CY	14" Thick
03 31 00	Perimeter Foundation Insulation	SF	10,392	1.32	13,687	2.0" Thick	
03 31 00	Dock Leveler Pits	EA	3	3,183	9,550		
03 31 00	Zamboni Pit	EA	1	5,503	5,503		
03 31 00	Escalator Pit, 4' 6"x14'x4'	EA	2	5,770	11,540		
03 31 00	Slab on Grade	SF	149,743	4.65	696,911		5.0" Thick
03 31 00	Ice/Arena Slab Premium	SF	23,021	5.30	121,932	4.0" Insl	6.0" Thick
03 31 00	6" Marshalling Premium	SF	8,923	0.55	4,884		6.0" Thick
03 31 00	8" Dock Slab Premium	SF	9,976	1.64	16,381		8.0" Thick
03 31 00	Intermediate Riser Steps	LF	1,880	51.40	96,636		
03 32 00	Shear Walls	SF	27,390	30.44	833,692	180 #/CY	14" Thick
03 32 00	6.25" Lightweight Composite Slabs	SF	106,181	4.91	520,973	5 #/CY	6.3" Thick
03 40 00	Precast Stadia	SF	40,407	50.04	2,021,868	10 Pc/Day	300T CC
05 12 00	Composite Steel Floor Framing	TN	797	3,168	2,525,206	15.0 #/SF	300T CC
05 12 00	Steel Beam and Joist Roof Framing	TN	618	3,168	1,959,409	8.0 #/SF	
05 12 00	Arena Roof Bow Trusses	TN	835	4,753	3,968,521	525.0 #/LF	
05 12 00	Steel Columns and Beams at Preca	TN	273	3,808	1,039,595	13.5 #/SF	
05 12 00	3" Composite Deck and Studs	SF	106,181	2.35	249,246	20 Gauge	3.0" Deck
05 12 00	3" Type N Steel Roof Deck	SF	151,566	1.86	281,973	22 Gauge	3.0" Deck
05 12 00	Steel Girt Wall Supports, 2.5#/SF	SF	55,706	5.78	322,030		
07 80 00	Spray Fireproofing	SF	106,181	3.23	342,925		
05 50 00	3 EA Suite Stairs, 15.00' Wide	VF	51	1,848	94,267	3,749 /VF	
05 50 00	4 EA Concourse Stairs, 22.50' Wide	VF	90	2,773	249,531		
05 50 00	Lobby Stair Cast Treads	LF	1,157	65.00	75,214		
05 50 00	Stair Railings, Pickett Style	LF	277	218.27	60,429	No Open Sides	
05 50 00	Lobby Stairs Rail Premium	LF	284	127.92	36,330	No Open Sides	

Item	Description	Unit	Quantity	Price	Amount	Cost/SF	Note
7	Finish Carpentry						
06 20 00	3 cm Granite Vanities	LF	60	260.02	15,601	10 LF/EA	
06 20 00	Storage & Closet Shelving	LF	180	7.13	1,284		
06 20 00	Bar Cabinet	LF	43	546.03	23,479	\$400 Mat'l	
06 20 00	Bar Back Cabinets	LF	35	786.03	27,511	\$600 Mat'l	
06 20 00	Chief Action Stations	LF	47	666.03	31,304	\$500 Mat'l	
06 20 00	Suite Base Cabinets	LF	326	666.03	217,127	\$500 Mat'l	
06 20 00	Suite Wall Cabinets	LF	162	306.03	49,577	\$200 Mat'l	
06 20 00	Suite Drink Rail Counters and Supp	LF	149	318.03	47,387	\$210 Mat'l	
06 20 00	Press Counters & Supports	LF	108	174.03	18,796	\$90 Mat'l	
06 20 00	Press Base Cabinets	LF	36	246.03	8,857	\$150 Mat'l	
06 20 00	Press Wall Cabinets	LF	35	180.03	6,301	\$95 Mat'l	
06 20 00	Press Storage Cubbies	LF	49	180.03	8,822	\$95 Mat'l	
06 20 00	Base Cabinets at Operation Spaces	LF	100	246.03	24,603	\$150 Mat'l	
06 20 00	Counters & Supports at Operations	LF	150	174.03	26,105	\$90 Mat'l	
06 20 00	Quartz Counter Tops	LF	487	174.03	84,754	\$90 Mat'l	
06 20 00	Solid Surface Counters	LF	100	156.03	15,603	\$75 Mat'l	
06 20 00	Club / Bar Millwork & Trim	SF	13,938	7.27	101,308		
06 20 00	Miscellaneous Millwork & Trim	SF	248,227	0.53	131,574		
	Total				839,994	\$2.85	
8	Roofing and Sheet Metal						
07 50 00	TPO Fully Adhered Membrane	SF	62,209	6.65	413,384	R30	60 mil
07 50 00	Roof Crickets, Interior	SF	3,110	4.04	12,570	5% Roof	
07 50 00	Membrane Parapet Flashing	SF	7,603	4.35	33,060		
07 60 00	Sheet Metal Flashings	LF	3,918	21.19	83,020		
07 60 00	Roof Expansion Joints	LF	267	35.38	9,442		
07 60 00	Gutters & Downspouts	LF	972	18.79	18,268		
07 40 00	Prefinished Standing Seam Roof	SF	94,058	11.64	1,094,615	Preformed Snap-On Type	
07 40 00	Nail Base & Insulation	SF	94,058	4.46	419,158	R20	
07 60 00	Misc Items	LS	1	11,640	11,640		
	Total				2,095,157	\$7.12	
9	Thermal and Moisture Protection						
07 10 00	Dampproof Elev Pits/Dock Walls	SF	1,600	2.42	3,877		
07 10 00	Waterproof/Drain Mat at Fdn Walls	SF	4,680	3.28	15,341		
07 10 00	Fluid Applied Membrane Air Barrier	SF	56,418	3.04	171,411	Not req'd if ext spray foam	
07 10 00	Transition Flashings at Glazing	LF	11,720	4.59	53,852		
07 80 00	Misc Fire Stopping	SF	294,438	0.00	0	Included in MEP Trades	
07 90 00	Building Skin & Window Caulking	LF	15,045	2.30	34,652		
07 90 00	Caulk CMU Control Joints	LF	11,762	2.30	27,091		
07 90 00	Caulk Door Frames at CMU	LF	9,418	1.77	16,680		
07 90 00	Misc Interior Caulking	SF	294,438	0.17	50,583		
07 90 00	Misc Caulking	LS	1	5,280	5,280		
	Total				378,767	\$1.29	

Item	Description	Unit	Quantity	Price	Amount	Cost/SF	Note
10	Doors and Hardware						
08 10 00	Hollow Metal Frames, Welded	EA	346	232.04	80,346		
08 10 00	HM SL/BL Frames, ±16 SF/EA	EA	35	448.04	15,682	10% Doors	
08 10 00	Hollow Metal Doors	EA	242	454.04	110,051		
08 10 00	7' Natural Birch Doors	EA	104	286.04	29,713		Includes Factory Finish
08 10 00	Stair Exit Door Premium	EA	10	883.64	8,836		Incl Dr, Fr, Hdwe Prem
08 70 00	Finish Hardware, Mortise Locks	EA	346	720.07	249,326		
08 70 00	Electronic Lock (Hotels) Premium	EA	6	360.00	2,160	2% Doors	
08 70 00	Unload & Distribute Dr, Frame, Hdw	EA	346	38.59	13,361		
08 30 00	Sectional Dock Door, 9'x10'	EA	3	2,892	8,676		
08 30 00	Coiling Overhead Door, 14'x14'	EA	7	13,364	93,550		
08 30 00	Coiling Door, Shutter or Grille	EA	15	5,572	83,583		6'x12' W/Electric Operator
	Total				695,285	\$2.36	
11	Glass and Glazing						
08 40 00	Industrial Style Curtainwall System	SF	34,973	133.92	4,683,446		
08 40 00	Aluminum Window Sills	LF	1,710	10.44	17,850	6" Wide	
08 40 00	Aluminum Ent Doors, 7 Feet Tall	EA	96	2,712	260,355		Incl Hdwe
08 40 00	ADA Door Operators	EA	2	2,232	4,464		
08 40 00	Interior Storefront	SF	3,060	65.86	201,530		
08 40 00	Mirrors	SF	888	11.05	9,813		
08 40 00	Glaze Sidelites & Borrow Lites	SF	560	13.50	7,560		
08 40 00	Door Lites and Misc Glazing	EA	35	69.00	2,415	10% Doors	
08 40 00	Final Glass Cleaning	SF	78,144	0.11	8,635		
	Total				5,196,070	\$17.65	
12	Interior Partitions						
04 20 00	8" CMU Partitions	SF	116,594	15.56	1,814,567	25% Grout	
04 20 00	8" Burnished CMU Partitions	SF	36,823	27.06	996,443	25% Grout	
09 20 00	6" Drywall Partitions	SF	5,655	9.58	54,152	16 Gauge	
09 20 00	Shaft Wall, Incl Fire Caulk	LF	742	130.66	97,008		
09 20 00	DWC & Drywall at Concrete Cores	SF	20,501	3.44	70,576		
09 20 00	One Hour Walls and Fire Caulk	LF	657	106.84	70,158	50% Sound Batts	
09 20 00	One Sided Wall & Bridging Premiun	LF	676	42.88	28,989		
09 20 00	Drywall Partitions, 50% Sound Batts	LF	1,571	96.34	151,400	100% Full Height	
09 20 00	Sound Batts at Demising Walls	SF	18,659	0.65	12,130		
09 20 00	Double Layer Drywall Prem	SF	37,318	1.21	45,054	65% Partitions	
09 20 00	Abuse Resistant Drywall Premium	SF	43,740	0.66	28,652	50% Partitions	
09 20 00	Drywall at Columns	SF	13,720	5.05	69,329	1.5 Ft Square	
07 80 00	Safing Insulation	LF	3,004	9.70	29,142		
09 20 00	Layout and Cleanup	SF	294,438	0.26	77,209		
09 20 00	Temporary Heat, Interiors	SF	294,438	0.25	72,873		
	Total				3,617,682	\$12.29	

Item	Description	Unit	Quantity	Price	Amount	Cost/SF	Note
13	Stone and Tile						
09 30 00	Porcelain Paver Tile	SF	5,719	10.33	59,069	\$5.00 Mat'l	2% Area
09 30 00	Quarry Tile Base	LF	843	10.90	9,189		3% Base
09 30 00	Patterned Ceramic Tile Walls	SF	41,351	8.77	362,582	\$4.00 Mat'l	10% Area
09 30 00	Wall Tile at Kitchen and Serving	SF	3,271	7.13	23,340	\$3.00 Mat'l	2887.611816
09 30 00	Misc Stone & Tile	SF	262,165	0.27	70,289		
	Total				524,469	\$1.78	
14	Ceilings and Acoustic						
09 90 00	Paint Exposed Structure - Highbay	SF	200,617	1.91	383,118		77% Area
09 20 00	Suspended Drywall Ceilings	SF	22,824	3.92	89,520		9% Area
09 20 00	Drywall Bulkheads	LF	22,824	27.52	628,162		
09 50 00	2x2 Acoustic Ceilings (Washable)	SF	15,904	4.27	67,932	\$2.50 Mat'l	6% Area
09 50 00	2x2 9/16" Grid Tegular Acoustic Ce	SF	47,222	4.15	195,802	\$2.40 Mat'l	18% Area
09 50 00	Wood Slat Suspended Ceiling	SF	3,485	25.42	88,572	\$17.00 Mat'l	1% Area
	Total				1,453,105	\$4.94	
15	Flooring						
09 90 00	Unfinished Exposed Floors	SF	15,727	0.00	0		6% Area
09 90 00	Clear Floor Sealer, One Coat	SF	98,593	0.30	29,124		38% Area
09 60 00	Polish, Stain & Seal Concrete	SF	61,751	5.24	323,503		24% Area
09 60 00	Rubber Sports Flooring	SF	2,028	13.95	28,297	\$10.00 Mat'l	1% Area
09 60 00	Carpet Tiles	SY	3,847	31.77	122,205	\$22.00 Mat'l	12% Area
09 66 00	Polyacrylate Terrazzo, 3/8" Thick	SF	7,711	20.67	159,411		3% Area
09 67 00	Fluid Applied Flooring	SF	39,345	12.14	477,530		15% Area
09 60 00	Floor Protection	SF	61,751	2.55	157,609		26% Area
09 60 00	Shot Blasting and Epoxy Sealers	SF	48,899	3.27	159,773		19% Area
09 60 00	Stair Treads and Risers	LF	5,580	24.20	135,048		
09 60 00	Resilient Base, 4"	LF	27,551	2.06	56,770		92% Base
09 67 00	Fluid Applied Cove Base	LF	1,709	12.14	20,736		6% Base
	Total				1,670,007	\$5.67	
16	Painting						
09 90 00	Stair & Service Room Walls	SF	28,593	0.45	12,845		7% Wall
09 90 00	Paint Stairs and Handrails	LF	262	7.45	1,950		
09 90 00	Finish Doors and Frames	EA	674	46.39	31,249		Door/frame counts as 2
09 90 00	CMU or Concrete Walls (Incl Blk Fil	SF	229,652	0.77	176,568		57% Wall
09 90 00	Paint Drywall Walls	SF	102,322	0.58	59,744		25% Wall
09 90 00	Drywall Ceilings	SF	45,648	0.81	36,753		
09 90 00	Misc. Items	LS	1	14,100	14,100		
09 90 00	Final Cleanup and Punchlist	SF	294,438	0.43	125,548		
	Total				458,757	\$1.56	

Item	Description	Unit	Quantity	Price	Amount	Cost/SF	Note
21	Fire Protection						
21 00 00	Sprinklers	SF	237,031	2.44	578,265		
21 00 00	Canopy Sprinklers	SF	3,716	3.33	12,362		
21 00 00	Fire Pump	GPM	750	86.27	64,704	84 HP	
21 00 00	FM 200 Suppression System	SF	250	28.89	7,224		
	Total				662,555	\$2.25	
22	Plumbing						
22 00 00	Backflow Preventer	EA	1	0.00			0 See Sitework
22 00 00	Roof and Overflow Drains	EA	32	767.54	24,561	4,000 SF per Drain	
22 00 00	Roof and Overflow Drain Piping	LF	3,576	53.84	192,521	10"Ø Pipe Avg Size	
22 00 00	Gas Piping System	SF	294,438	0.68	199,770		
22 00 00	Water Heating System	EA	1	31,316	31,316		
22 00 00	Fuel Oil Storage Tank System	Gal	7,500	12.93	96,981		
22 00 00	Sewer & Water Mains	LF	811	207.41	168,283		Incl Excavation/Backfill
22 00 00	Plumbing Risers (DWV, HW, CW)	LF	534	216.21	115,349		
22 00 00	Pipe Runs & Carriers (DWV, HW, CV)	EA	293	1,390	406,909		
22 00 00	Plumbing Fixtures	EA	293	1,992	583,127		
22 00 00	Motion Sensor Valves	EA	208	277.85	57,792		
22 00 00	Domestic Water Boost Pump	EA	1	13,331	13,331		
22 00 00	Floor Drains	EA	48	321.70	15,441		
22 00 00	Kitchen Plumbing	SF	15,904	11.29	179,611		
22 00 00	Kitchen Grease Interceptor	LS	1	24,734	24,734		
22 00 00	Kitchen Equipment Hookup	LS	1	91,609	91,609		
22 00 00	Roof Drain Insulation	%	15%		32,562		
22 00 00	Plbg Fixture Insulation	EA	293	315.47	92,339		
	Total				2,326,238	\$7.90	
23	HVAC Systems						
23 00 00	Central Chiller Plant & Cooling Tow	TN	740	1,094	809,691		Includes Plant Piping
23 00 00	Central Boiler System, Single Fuel	HP	350	1,106	387,243		12,000 MBH
23 00 00	Cooling at Elev Mach Rm	TN	10.5	775.85	8,146		
23 00 00	Unit Heaters and Cabinet Heaters	EA	48	815.09	39,124		Electric
23 00 00	Heating Water Risers	LF	308	148.18	45,605		Incl Insulation
23 00 00	On-Floor Air Handling Units	CFM	195,000	5.31	1,035,721	\$4.24 /CFM Equip	
23 00 00	Dedicated Outside Air System	CFM	9,064	7.97	72,214		Locker Rms
23 00 00	Toilet & Janitor Exhaust	EA	24	355.85	8,540		
23 00 00	Locker Room Exhaust	CFM	9,064	0.71	6,451		
23 00 00	Arena Smoke Exhaust System	CFM	57,407	2.92	167,454		
23 00 00	Sheet Metal Duct/GRD's	SF	281,243	15.69	4,412,253	25% Fittings 1.5 #/SF	
23 00 00	Interior VAV Boxes	EA	58	780.00	45,592	40,916 SF	
23 00 00	Temperature Controls	SF	216,191	2.35	508,269		
23 00 00	Test and Balance	SF	281,243	0.30	84,373		
23 00 00	Kitchen Make-Up & Exhaust	LS	1	110,100	110,100		
23 00 00	Sheet Metal Insulation	SF	281,243	1.56	439,915		
23 00 00	System Validation	SF	281,243	0.16	43,630		
	Total				8,224,323	\$27.93	

Item	Description	Unit	Quantity	Price	Amount	Cost/SF	Note
24	Electrical						
26 00 00	480V Service Entrance & Switchgear	AMP	5,000	43.83	219,147		
26 00 00	TVSS Switchgear Premium	EA	2	13,297	26,593		
26 00 00	Power Distribution System	SF	294,438	3.72	1,095,041	1,340,781	
26 00 00	Cable Tray, 4" Deep	LF	2,806	25.96	72,843	Yes	24" Wide
26 00 00	HVAC Hookup	TN	751	66.13	49,628		
26 00 00	Fan Powered VAV Box Hookup	EA	58	133.01	7,775		
26 00 00	Hookup AHU's	CFM	204,064	0.06	12,295		
26 00 00	Unit and Cabinet Heater Hookup	EA	48	254.10	12,197		
26 00 00	Elevator Hookup	EA	7	6,406	44,840		
26 00 00	Fire Pump Hookup	HP	84	64.95	5,444		
26 00 00	Plumbing Motion Sensor Hookup	EA	208	144.44	30,044		
26 00 00	Hookup Hold Opens and Operators	EA	2	234.76	470		
26 00 00	Main Lobby Lighting Premium	SF	15,369	7.79	119,685		
26 00 00	Exit & Egress Lighting	SF	294,438	0.20	58,756		
26 00 00	Lighting Installation; EMT Conduit	EA	1,985	144.63	287,061	80 SF/EA	100% Area
26 00 00	Light Fixture Materials	EA	1,985	135.00	267,947	\$113 /Fixture	
26 00 00	Sports Lighting	SF	17,000	9.92	168,621	100 SF/EA	
26 00 00	Lighting at Mech & Whse Areas	SF	37,840	2.06	78,069	225 SF/EA	
26 00 00	Direct/Indirect Linear Lighting	LF	4,033	79.30	319,844	25% Area	\$50.00/LF
26 00 00	Canopy and Soffit Lighting	SF	3,716	6.18	22,983		
26 00 00	Exterior Building Lighting	EA	77	2,600	200,050		
26 00 00	Light Switches	EA	198	121.75	24,089	150%	
26 00 00	Motion Sensor Light Controls	EA	99	196.09	19,399	50%	
26 00 00	EMT Wall Outlets	EA	2,441	173.51	423,522	100% Area	
26 00 00	Floor Outlets, Poke-Thru	EA	244	517.13	126,231	10%	
26 00 00	Workstations, 7 Wire Floor	EA	15	625.39	9,381	50%	
26 00 00	Dedicated Circuits	EA	52	392.28	20,399		
	Special Systems						
26 00 00	Emergency Generator & ATS	KW	1,000	313.93	313,930	3.40 Watts/SF	
26 00 00	Lightning Protection	SF	153,459	0.29	44,852		
28 00 00	Life Safety Systems	SF	294,438	1.41	415,504		
26 00 00	Telephone/Data Outlets	EA	218	135.88	29,686	600 SF/EA	
26 00 00	Telephone/Data Floor Outlets	EA	218	601.80	131,477	50%	
27 00 00	Tel/Data Cabling (No Hookup)	EA	437	287.85	125,773	600 SF/EA	
27 00 00	Fiber Optic Backbone	LF	2,093	11.65	24,375		
27 00 00	Sound Systems	ALLOW	1	750,000	750,000		
27 00 00	Wifi System Allowance	ALLOW	1	500,000	500,000		
27 00 00	Broadcast Systems Allowance	LS	1	600,000	600,000		
27 00 00	Video Ribbon Boards	ALLOW	1	1,051,200	1,051,200		
27 00 00	Center Hung Scoreboard Structure	ALLOW	1	500,000	500,000		
27 00 00	Center Videoboard	ALLOW	1	1,000,000	1,000,000		
27 00 00	Cable TV System Outlets	EA	52	282.57	14,693		
26 00 00	Special Systems Conduit	SF	294,438	0.47	138,465		
28 00 00	Card Access Entrances	EA	6	1,993	11,958		
28 00 00	CCTV Cameras @ Entrances	EA	6	5,500	33,000		
26 00 00	Kitchen Equipment Hookup	LS	1	135,016	135,016		
26 00 00	Temporary Wiring	SF	294,438	0.19	56,707		
26 00 00	System Validation	SF	294,438	0.23	67,132		
26 00 00	Temporary Power Bills	SF	294,438	0.65	191,385		
	Total				9,857,504	\$33.48	

WATERWORKS
RENOVATION COST
ESTIMATE

Savannah Waterworks Renovation
Savannah, GA
February 12, 2016

Concept Estimate

Total Project Summary Worksheet

Description	Area	Cost	Cost/SF
Total Construction Cost	27,557 SF	\$7,623,872	\$276.66

The following items are those normally provided by the owner during the course of the project. These costs are not included in the construction estimate.

Site Acquisition Cost		NA
Offsite Utility Relocation Cost		By Others
Hazardous Materials Abatement (if any)		Included below
Street Improvements (if required)		Included below
Special Assessments or Development Fees		Included below
Site Survey		Included below
Soil Borings and Report		Included below
Architect and Engineer's Fees		Included below
Drawing Reproduction Costs		Included below
Testing and Inspections		Included below
Furnishings		NA
Artwork		NA
Telephone System		NA
Data Cabling		NA
Moving Expenses		NA
Financing Costs		NA
Legal Fees		Included below
Owner Soft Cost Allowance	10%	762,387
Owner's Contingency		Included Above

Total Project Cost

\$8,386,260

Savannah Waterworks Renovation
Savannah, GA
February 12, 2016

Concept Estimate

Construction Cost Summary

<i>Description</i>	<i>Quantity</i>	<i>Cost</i>	<i>Unit Cost</i>
Offsite Improvements			
		By Others	
Waterwork Building Core & Shell Ren	27,557 SF	6,254,202	226.96
Construction Subtotal	<u>27,557 SF</u>	<u>6,254,202</u>	<u>\$226.96</u>
Design Fees & Reimbursables	0%	0	0.00
Design & Estimating Contingency	10%	625,420	22.70
Construction Contingency	5%	312,710	11.35
Escalation to 2nd Qtr 2017	6%	431,540	15.66
Total Construction Cost	<u>27,557 SF</u>	<u>\$7,623,872</u>	<u>\$276.66</u>

Savannah Waterworks Renovation
Savannah, GA
February 12, 2016

Concept Estimate

Waterwork Building Core & Shell Renovation
27,557 SF

<i>Item</i>	<i>Description</i>	<i>Cost</i>	<i>Cost/SF</i>
1	General Requirements	419,032	15.21
2	Demolition	162,810	5.91
3	Excavation	8,600	0.31
4	Structure	1,055,745	38.31
5	Enclosure	1,003,470	36.41
6	Rough Carpentry	32,132	1.17
7	Finish Carpentry	7,061	0.26
8	Roofing and Sheet Metal	338,326	12.28
9	Thermal and Moisture Protection	11,488	0.42
10	Doors and Hardware	29,290	1.06
11	Glass and Glazing	1,126,529	40.88
12	Interior Partitions	180,028	6.53
13	Stone and Tile	41,234	1.50
14	Ceilings and Acoustic	97,125	3.52
15	Flooring	28,491	1.03
16	Painting	30,138	1.09
17	Specialties	15,575	0.57
18	Equipment and Furnishings	10,251	0.37
19	Special Construction	50,000	1.81
20	Elevators	91,745	3.33
21	Fire Protection	85,407	3.10
22	Plumbing	180,446	6.55
23	HVAC Systems	499,110	18.11
24	Electrical	234,096	8.49
	Subtotal	5,738,128	208.23
	Permits, Bonds and Insurance	304,580	11.05
	Contingency	0	0.00
	Escalation or Other	0	0.00
	Fee	211,495	7.67
	Total	\$6,254,202	\$226.96

Skin/Floor Area Ratio 92%
Glass/Skin Area Ratio 30%

Total Skin Cost, Contact Area \$89.63 /SF
Skin Cost, Bldg Area \$77.29 /SF

Item	Description	Unit	Quantity	Price	Amount	Cost/SF	Note
2	Demolition						
02 40 00	Interior Partitions and Finishes	SF	27,557	3.60	99,256	50% Total Gut	
02 40 00	Slab on Grade, Neat for Plumbing	SF	5,000	6.72	33,617	Incl sawcut and demo	
02 40 00	Temporary Protection	LS	1	11,839	11,839		
02 40 00	Demolition Cleanup	SF	27,557	0.17	4,811		
02 40 00	Equipment & Dumpsters	%	10%		13,287		
	Total				162,810	\$5.91	
3	Excavation						
31 20 00	Machine Excavation	CY	213	2.75	586	1.0' Avg	50 CY/HR
31 20 00	Haul Surplus Earth	CY	213	11.96	2,546		10 CY/HR
31 20 00	Select Fill Cap at SOG	CY	89	35.61	3,158	6" Thick	
03 31 00	Utility Loader & Operator	WK	0.38	4,953	1,898		
31 31 00	Soil Poisoning	SF	5,000	0.08	412		
	Total				8,600	\$0.31	
4	Structure						
03 31 00	Elevator Pit Walls	SF	180	29.64	5,334	150 #/CY	8" Thick
03 31 00	Repair/Replace Slab on Grade	SF	4,789	4.39	21,020		4.0" Thick
03 32 00	5.25" Lightweight Composite Slabs	SF	8,400	4.45	37,392	5 #/CY	5.3" Thick
05 12 00	Composite Steel Floor Framing	TN	117	3,063	358,231	10.3 #/SF	150T CC
05 12 00	Repairs to Ex Steel Roof Framing	TN	19	3,063	57,814	6.8 #/SF	
05 12 00	2" Composite Deck and Studs	SF	8,400	2.05	17,224	20 Gauge	2.0" Deck
05 12 00	1.5" Type B Steel Roof Deck	SF	21,657	1.32	28,514	22 Gauge	1.5" Deck
05 12 00	Acoustic Roof Deck Premium	SF	21,657	0.51	11,061		
05 12 00	Repairs to Ex Steel Framing	SF	9,865	5.32	52,511		
09 20 00	Drywall Fireproofing at Roof	SF	22,293	0.00	0		
07 80 00	Spray Fireproofing	SF	22,768	0.00	0		
05 50 00	2 EA Exit Stairs, 4.00' Wide	VF	50	461.59	23,080	980 /VF	
05 50 00	Stair Railings, Pickett Style	LF	103	212.01	21,806	No Open Sides	
05 50 00	Wall Railings	LF	133	30.99	4,117		
05 50 00	Grand Stair, 10 Feet Wide	VF	25	2,678	66,958	10.00' Wide	
05 70 00	Glass or Ornamental Metal Railing	LF	464	330.54	153,464		
05 50 00	Suspended Masonry Supports	LF	422	96.45	40,685		
05 50 00	Masonry Lintels or Shelf Angles	LF	528	41.99	22,186		
05 50 00	Curtainwall Support Steel, 5#/SF	SF	634	14.27	9,051	50% Curtainwall	
05 50 00	Pop Up Supports, HDGalv	SF	3,360	21.41	71,929		
05 50 00	Other Miscellaneous Steel	TN	1	5,289	7,287	0.10 #/SF	
03 31 00	Housekeeping Pads, Etc	SF	138	13.35	1,840		
03 31 00	Equipment Foundations	SF	31	30.52	946		
03 32 00	Pan Stair Fill	SF	1,177	5.53	6,510		
03 31 00	Foundation and Misc Hoisting	WK	4	7,152	28,609	65T RT	
03 80 00	Crane In/Out and Up/Down	LS	1	2,000	2,000		
03 80 00	Crane In/Out and Up/Down	LS	1	0.00	0		
03 31 00	Layout and Cleanup	SF	27,557	0.20	5,464		
03 32 00	Weather Conditions	LS	1.00%		712		
	Total				1,055,745	\$38.31	

Item	Description	Unit	Quantity	Price	Amount	Cost/SF	Note
5	Enclosure						
03 40 00	Repair, Patch, Flash and Clean Copin	LF	1,000	50.00	50,000		
04 20 00	Repair, Patch, Point, Clean Brick	SF	17,758	45.00	799,092		
04 20 00	Allow to Repair/Replace Terra Ctta	Allw	1	50,000	50,000		
07 24 00	12" Wide Metal Wall Panels at Pop Up	SF	3,360	14.00	47,037		
07 40 00	HVAC Louvers	SF	100	57.19	5,719		
09 20 00	Exterior Wall Furring	SF	1,220	1.34	1,630		
09 20 00	Furring Insul, Rigid Styrofoam	SF	1,220	1.36	1,659	2.0" Thick	
09 20 00	Perimeter Drywall	SF	1,220	1.50	1,835		
09 20 00	Aluminum Soffits	SF	2,500	16.10	40,247		
09 20 00	Building Skin Review	LS	1	6,250	6,250		
	Total				1,003,470	\$36.41	
6	Rough Carpentry						
06 10 00	Roof Blocking	BF	1,961	6.22	12,200	2.0 BF/LF Parapet	
06 10 00	Plywood at Parapet	SF	2,500	3.89	9,716		
06 10 00	Interior Blocking	SF	27,557	0.25	6,889		
06 10 00	Layout and Cleanup	SF	27,557	0.12	3,326		
	Total				32,132	\$1.17	
7	Finish Carpentry						
06 20 00	2 cm Granite Vanities	LF	24	130.75	3,138	at Public Toilets	
06 20 00	Misc Shelving	LF	300	7.08	2,123		
06 20 00	Misc. Items	LS	1	1,800	1,800		
	Total				7,061	\$0.26	
8	Roofing and Sheet Metal						
07 50 00	2 Ply Modified Bitumen (Cold)	SF	990	6.65	6,581	R30	
07 50 00	Roof Crickets, Interior	SF	50	3.28	163	5% Roof	
07 50 00	Energy Star Premium	SF	990	0.70	693	Mod Bit & BU Roofs	
07 50 00	Membrane Parapet Flashing	SF	2,500	3.63	9,079		
07 60 00	Sheet Metal Flashings	LF	981	21.19	20,779		
07 60 00	Gutters & Downspouts	LF	802	18.79	15,064		
07 40 00	Painted Standing Seam Roof	SF	21,303	9.11	193,980	Preformed Snap-On Type	
07 40 00	Nail Base & Insulation	SF	21,303	4.27	90,908	R20	
07 60 00	Misc Items	LS	1	1,080	1,080		
	Total				338,326	\$12.28	
9	Thermal and Moisture Protection						
07 10 00	Dampproof Elev Pits	SF	180	5.40	973		
07 80 00	Misc Fire Stopping	SF	27,557	0.00	0	Included in MEP Trades	
07 90 00	Building Skin & Window Caulking	LF	4,735	2.04	9,665		
07 90 00	Caulk CMU Control Joints	LF	135	2.04	276		
07 90 00	Caulk Door Frames at CMU	LF	61	1.54	94		
07 90 00	Misc Caulking	LS	1	480.00	480		
	Total				11,488	\$0.42	

Item	Description	Unit	Quantity	Price	Amount	Cost/SF	Note
10	Doors and Hardware						
08 10 00	Hollow Metal Frames, Welded	EA	18	263.16	4,737		
08 10 00	HM SL/BL Frames, ±16 SF/EA	EA	2	510.01	1,020	10% Doors	
08 10 00	8' White Oak Doors	EA	18	407.16	7,329		Includes Factory Finish
08 10 00	Stair Exit Door Premium	EA	4	1,008	4,031		Incl Dr, Fr, Hdwe Prem
08 70 00	Finish Hardware, Cylinder Locks	EA	16	672.82	10,900		
08 70 00	Hinges, Locks, & Stops Only	EA	2	336.82	606	10% Doors	
08 70 00	Unload & Distribute Dr, Frame, Hdwe	EA	18	37.08	667		
	Total				29,290	\$1.06	
11	Glass and Glazing						
08 40 00	Punch Windows	SF	6,342	125.00	792,750		
08 40 00	Curtainwall	SF	1,268	125.00	158,550		
08 40 00	Aluminum Ent Doors, 16 Feet Tall	EA	8	6,199	49,592		Incl Hdwe
08 40 00	ADA Door Operators	EA	2	2,232	4,464		
08 40 00	Interior Storefront	SF	1,100	27.52	30,271		
08 60 00	Skylights @ Pop Ups	SF	1,250	69.75	87,189		
08 40 00	Mirrors	SF	132	11.05	1,459		
08 40 00	Glaze Sidelites & Borrow Lites	SF	32	13.50	432		
08 40 00	Final Glass Cleaning	SF	17,617	0.10	1,822		
	Total				1,126,529	\$40.88	
12	Interior Partitions						
04 20 00	8" CMU Partitions	SF	1,762	14.06	24,773	25% Grout	
09 20 00	Shaft Wall, Incl Fire Caulk	LF	419	140.29	58,826		
09 20 00	One Hour Walls and Fire Caulk	LF	690	114.71	79,194	50% Sound Batts	
09 20 00	One Sided Wall & Bridging Premium	LF	59	49.42	2,891		
07 80 00	Safing Insulation	LF	369	8.05	2,968		
09 20 00	Layout and Cleanup	SF	27,557	0.21	5,692		
09 20 00	Temporary Heat, Interiors	SF	27,557	0.21	5,684		
	Total				180,028	\$6.53	
13	Stone and Tile						
09 30 00	2x2 Porcelain Tile	SF	144	7.25	1,045	\$2.50 Mat'l	1% Area
09 30 00	Stone Tile	SF	847	14.57	12,343	\$8.00 Mat'l	4% Area
09 30 00	Kitchen Quarry Tile Floors	SF	1,195	9.05	10,820	\$3.00 Mat'l	5% Area
09 30 00	Tile Base	LF	189	9.41	1,774	\$4.00 Mat'l	128% Base
09 30 00	Patterned Ceramic Tile Walls	SF	192	8.69	1,669	\$4.00 Mat'l	1% Area
09 30 00	Stone Tile Walls	SF	932	14.57	13,582	\$8.00 Mat'l	2% Area
	Total				41,234	\$1.50	
14	Ceilings and Acoustic						
09 90 00	Paint Exposed Structure	SF	19,125	0.64	12,314		80% Area
09 20 00	Suspended Drywall Ceilings	SF	2,391	4.85	11,602		10% Area
09 20 00	Drywall Bulkheads	LF	2,415	27.19	65,653		
09 50 00	2x2 Acoustic Ceilings	SF	2,391	3.16	7,557	\$1.78 Mat'l	10% Area
	Total				97,125	\$3.52	

Item	Description	Unit	Quantity	Price	Amount	Cost/SF	Note
15	Flooring						
09 90 00	Unfinished Exposed Floors	SF	13,353	0.00	0		56% Area
09 60 00	Stain and Seal Concrete	SF	8,367	2.13	17,791		35% Area
09 60 00	Floor Protection	SF	8,367	1.24	10,400		0% Area
09 60 00	Resilient Base, 4"	LF	147	2.04	300		100% Base
	Total				28,491	\$1.03	
16	Painting						
09 90 00	Paint Exterior Skin	SF	1,268	0.74	945		5% Area
09 90 00	Stair & Service Room Walls	SF	7,560	0.45	3,396		20% Wall
09 90 00	Paint Stairs and Handrails	LF	139	7.45	1,037		
09 90 00	Finish Doors and Frames	EA	20	46.39	928		Door/frame counts as 2
09 90 00	CMU or Concrete Walls (Incl Blk Filler)	SF	2,861	0.77	2,199		8% Wall
09 90 00	Paint Drywall Walls	SF	26,101	0.45	11,726		69% Wall
09 90 00	Drywall Ceilings	SF	4,805	0.54	2,575		
09 90 00	Misc. Items	LS	1	1,300	1,300		
09 90 00	Final Cleanup and Punchlist	SF	27,557	0.22	6,032		
	Total				30,138	\$1.09	
17	Specialties						
10 14 00	Signage and Directories	LS	1	1,000	1,000		
10 14 00	Door Signs	EA	18	39.57	712		
10 21 00	Toilet Partitions	EA	10	723.36	7,234		
10 40 00	Fire Extinguishers and Cabinets	EA	6	193.13	1,159		
10 28 00	Toilet Accessories Public Toilets	EA	4	826.44	3,306		
10 28 00	Toilet Accessories Small Toilets	EA	4	266.26	1,065		
10 00 00	Misc. Items	LS	1	1,100	1,100		
	Total				15,575	\$0.57	
18	Equipment and Furnishings						
11 00 00	Misc Equipment	LS	1	0.00	0		
12 40 00	Entrance Mat & Frames	SF	192	53.39	10,251		
	Total				10,251	\$0.37	
19	Special Construction						
09 99 00	Main Lobby Finishes	SF	500	100.00	50,000		
	Total				50,000	\$1.81	
20	Elevators						
14 20 00	Hydraulic Elevator, 2 Stops	EA	1	76,745	76,745		2,500# 200 fpm
14 20 00	Cab Finish Premium	EA	1	15,000	15,000		
	Total				91,745	\$3.33	
21	Fire Protection						
21 00 00	Sprinklers	SF	27,557	2.86	78,698		
21 00 00	Canopy Sprinklers	SF	2,500	2.68	6,710		
	Total				85,407	\$3.10	

Item	Description	Unit	Quantity	Price	Amount	Cost/SF	Note
22	Plumbing						
22 00 00	Backflow Preventer	EA	1	0.00	0		See Sitework
22 00 00	Hydraulic Elev Sump Pump & Tank	EA	1	3,517	3,517		
22 00 00	Water Heaters	EA	2	2,931	5,862		
22 00 00	Sewer & Water Mains	LF	134	172.84	23,234		Incl Excavation/Backfill
22 00 00	Plumbing Risers (DWV, HW, CW)	LF	90	144.14	12,973		
22 00 00	Wet Columns - HW,CW,SD,SV	EA	2	6,486	12,973		
22 00 00	Plumbing Fixtures	EA	34	2,546	85,929		
22 00 00	Motion Sensor Valves	EA	18	277.85	5,001		
22 00 00	Floor Drains	EA	10	321.70	3,217		
22 00 00	Kitchen Grease Interceptor	LS	2	9,894	19,787		
22 00 00	Kitchen Equipment Hookup	LS	1	0.00	0		
22 00 00	Roof Drain Insulation	%	10%		0		
22 00 00	Plbg Fixture Insulation	EA	34	235.62	7,954		
	Total				180,446		\$6.55
23	HVAC Systems						
23 00 00	Central Chiller Plant & Cooling Tower	TN	90	1,821	163,850		Includes Plant Piping
23 00 00	Single Zone RTU's (Avg 3-25 TN)	TN	10	1,243	12,430		
23 00 00	Additional Cooling for People Loads	TN	20	1,821	36,411		200 SF/Person
23 00 00	Supp Cooling at Elec/Data Rms	TN	5	2,623	13,117		
23 00 00	Cooling at Elev Mach Rm	TN	1.5	775.85	1,164		
23 00 00	Unit Heaters and Cabinet Heaters	EA	2	815.09	1,630		Electric
23 00 00	Air Handling Units	CFM	27,557	3.39	93,457		\$2.64 /CFM Equip
23 00 00	Toilet & Janitor Exhaust	EA	10	355.85	3,558		
23 00 00	Sheet Metal Duct/GRD's	SF	25,557	3.14	80,190		25% Fittings 0.3 #/SF
23 00 00	Secondary Sheet Metal Duct/GRD's	SF	2,000	3.14	6,275		25% Fittings 0.3 #/SF
23 00 00	15 KW Elec FPVAV Boxes	EA	11	960.00	10,668		
23 00 00	Temperature Controls	SF	25,557	1.98	50,589		
23 00 00	Secondary Temperature Controls	SF	2,000	0.99	1,979		
23 00 00	Test and Balance	SF	27,557	0.15	4,134		
23 00 00	Sheet Metal Insulation	SF	27,557	0.56	15,383		
23 00 00	System Validation	SF	27,557	0.16	4,275		
	Total				499,110		\$18.11
24	Electrical						
26 00 00	480V Service Entrance & Switchgear	AMP	1,050	41.89	43,985		
26 00 00	TVSS Switchgear Premium	EA	1	13,278	13,278		
26 00 00	Power Distribution System	SF	27,557	1.88	51,815		109,078
26 00 00	HVAC Hookup	TN	122	61.55	7,479		
26 00 00	Fan Powered VAV Box Hookup	EA	11	456.42	5,072		
26 00 00	Hookup Supplemental Cooling	TN	5	138.21	691		
26 00 00	Hookup AHU's	CFM	27,557	0.03	869		
26 00 00	Unit and Cabinet Heater Hookup	EA	2	233.52	467		
26 00 00	Elevator Hookup	EA	1	5,967	5,967		
26 00 00	Plumbing Motion Sensor Hookup	EA	18	128.43	2,312		
26 00 00	Hookup Hold Opens and Operators	EA	2	207.31	415		
26 00 00	Lighting and Power at Core Areas	SF	2,973	6.76	20,081		
26 00 00	Main Lobby Lighting Premium	SF	500	8.24	4,122		
26 00 00	Exit & Egress Lighting	SF	27,557	0.19	5,146		
26 00 00	Canopy and Soffit Lighting	SF	2,500	5.70	14,257		
26 00 00	Light Switches	EA	15	110.50	1,657		150%

<i>Item</i>	<i>Description</i>	<i>Unit</i>	<i>Quantity</i>	<i>Price</i>	<i>Amount</i>	<i>Cost/SF</i>	<i>Note</i>
26 00 00	Motion Sensor Light Controls	EA	8	187.12	1,403	50%	
	<i>Special Systems</i>						
28 00 00	Life Safety Systems	SF	27,557	0.44	12,010		
26 00 00	Special Systems Conduit	SF	27,557	0.07	1,962		
28 00 00	Card Access Entrances	EA	2	1,956	3,913		
28 00 00	CCTV Cameras @ Entrances	EA	2	6,500	13,000		
26 00 00	Kitchen Equipment Hookup	LS	1	0.00	0		
26 00 00	Temporary Wiring	SF	27,557	0.00	0		
26 00 00	System Validation	SF	27,557	0.23	6,283		
26 00 00	Temporary Power Bills	SF	27,557	0.65	17,912		
	Total				<u>234,096</u>	\$8.49	

EXISTING BUILDINGS
WITH ARENA
DEMOLITION
COST ESTIMATE

**Existing Arena & Mercer Theater
Savannah, GA
February 12, 2016**

Concept Estimate Revised

Total Project Summary Worksheet

Description	Area	Cost	Cost/SF
Total Construction Cost	104,874 SF	\$29,346,368	\$279.83

The following items are those normally provided by the owner during the course of the project. These costs are not included in the construction estimate.

Site Acquisition Cost		Included below
Offsite Utility Relocation Cost		By Others
Hazardous Materials Abatement (if any)		Included below
Street Improvements (if required)		By Others
Special Assessments or Development Fees		Included below
Site Survey		Included below
Soil Borings and Report		Included below
Architect and Engineer's Fees		Included below
Drawing Reproduction Costs		Included below
Testing and Inspections		Included below
Furnishings Fixtures & Equipment (FF&E)		Included below
Basketball Court / Goals		Included below
Artwork		Included below
Telephone System		Included below
Moving Expenses		Included below
Financing Costs		NA
Legal Fees		Included below
Owner Soft Cost Allowance	25%	\$7,336,592
Owner's Contingency		Included Above

Total Project Cost

\$36,682,960

**Existing Arena & Mercer Theater
Savannah, GA
February 12, 2016**

Concept Estimate Revised

Arena Demolished Construction Cost Summary

<i>Description</i>	<i>Quantity</i>	<i>Cost</i>	<i>Unit Cost</i>
Offsite Improvements		By Others	
Arena Demo & New Parks	8.49 Acre	2,121,141	249,923
Perry Street Extension	625 LF	769,483	1,231
Mercer Theater Renovations	100,874 SF	20,118,468	199.44
South Restroom & Canopy Addition	4,000 SF	1,065,041	266.26
Construction Subtotal	104,874 SF	24,074,133	\$229.55
Design Fees & Reimbursables	0%	0	0.00
Design & Estimating Contingency	10%	2,407,413	22.96
Construction Contingency	5%	1,203,707	11.48
Escalation to 2nd Qtr 2017	6%	1,661,115	15.84
Total Construction Cost	104,874 SF	\$29,346,368	\$279.83

**Existing Arena & Mercer Theater
Savannah, GA
February 12, 2016**

Concept Estimate Revised

Arena Demo & New Parks

<i>Item</i>	<i>Description</i>	<i>Cost</i>
1	General Requirements	142,116
2	Excavation and Grading	621,899
3	Asphalt Paving	233,757
4	Concrete Work	152,944
5	Site Structures	64,010
6	Fencing	54,119
7	Specialty Paving	51,021
8	Signage and Striping	32,062
9	Site Specialties	39,461
10	Site Utilities	46,043
11	Storm Drainage Systems	96,510
12	Fire Protection	56,149
13	Landscaping and Irrigation	242,765
14	Electrical	113,254
	Subtotal	<u>1,946,112</u>
	Permits, Bonds and Insurance	103,300
	Contingency	0
	Escalation or Other	0
	Fee	71,729
	Total	<u>\$2,121,141</u>

Item	Description	Unit	Quantity	Price	Amount	Note	Note
2	Excavation and Grading						
31 20 00	Site Demolition & Clearing	AC	8.49	5,507	46,742	35% Green Area	
31 20 00	Building and Foundation Demc	SF	84,224	4.50	379,008	Include Fdns?	Yes
31 20 00	Temporary Erosion Control	AC	8.49	3,021	25,637		
31 20 00	Site Stripping	CY	6,846	0.92	6,284	6" Thick	150 CY/HR
31 20 00	Site Cuts	CY	13,693	4.13	56,558	1.0' Avg	100 CY/HR
31 20 00	Site Fills	CY	13,693	2.07	28,279	1.0' Avg	200 CY/HR
31 20 00	Fine Grading	SF	369,701	0.07	25,451	2,000 SF/HR	
31 20 00	Respread Topsoil & Grade	CY	3,379	3.41	11,513	6" Thick	25 CY/HR
31 20 00	Temporary Roads and Parking	SF	46,800	0.64	30,095	6" Thick	
31 20 00	Temporary Fencing	LF	1,897	6.50	12,333		
	Total				621,899		
3	Asphalt Paving						
32 12 00	Full Thick Asphalt Parking, 6"	SY	3,600	25.49	91,766	6.0 Inches	
32 12 00	Full Thick Asphalt Drives, 8"	SY	4,178	33.99	141,991	8.0 Inches	
	Total				233,757		
4	Concrete Work						
32 13 00	Curb & Gutter	LF	2,722	13.61	37,040		
32 13 00	Walks and Slabs	SF	10,000	5.03	50,267	4.0" Thick	4"AggBase
32 13 00	Drive Entrances	SF	1,800	7.22	12,997		0"AggBase
32 13 00	Brick or Precast Paver Subslab	SF	5,000	3.71	18,558	4.0" Thick	0"AggBase
07 90 00	Caulk Exterior Slabs	LF	1,815	1.68	3,052		
32 13 00	6" Protection Bollards	EA	8	269.10	2,153		
32 13 00	24"Ø Light Pole Bases	EA	8	564.31	4,514	6' High	
32 13 00	12"Ø Pedestrian Light and Boll	EA	10	274.80	2,748	3' High	
32 13 00	Misc Site Concrete	LS	1	3,000	3,000		
32 13 00	Site Layout and Misc Cleanup	DA	27	690.10	18,615		
	Total				152,944		
5	Site Structures						
32 32 00	Structural Excavation	CY	97	10.22	987		
32 32 00	Compacted Backfill	CY	71	13.33	948		
32 32 00	Granular Backfill Chimney	CY	107	21.61	2,306		
32 32 00	Retaining Wall Footings	CY	19	457.39	8,538	150 #/CY	
32 32 00	Concrete Retaining Walls	SF	800	26.98	21,581	12" Thick	
32 32 00	Sandblast Retaining Walls	SF	800	2.06	1,651		
32 32 00	Stone Veneer at Retaining Wal	SF	800	35.00	28,000		
	Total				64,010		
6	Fencing						
32 31 00	Wrought Iron Fencing, 6'	LF	400	84.56	33,825		
04 20 00	Masonry Columns & Caps	EA	13	1,522	20,295	6' Tall	
	Total				54,119		

Item	Description	Unit	Quantity	Price	Amount	Note	Note
7	Specialty Paving						
32 14 00	Brick Pavers	SF	5,000	10.20	51,021		
	Total				51,021		
8	Signage and Striping						
10 10 00	Monument Sign	LS	1	24,517	24,517		
10 10 00	Misc Signage	EA	19	171.42	3,270		
10 10 00	Striping & Marking	EA	194	6.39	1,241		
10 10 00	Striping Handicap Parking	EA	6	19.18	115		
10 10 00	Painted Curbs & Stencils	LF	681	4.29	2,920	25%	
	Total				32,062		
9	Site Specialties						
32 30 00	Site Furniture Allowance	LS	1	20,000	20,000		
10 70 00	Flagpoles	EA	2	3,071	6,143		
32 30 00	Trash Enclosure, Single	EA	1	13,318	13,318		
	Total				39,461		
10	Site Utilities						
33 00 00	Sanitary Sewer	LF	365	43.77	15,969	6 Feet Deep	8" HDPE
33 00 00	Sanitary Sewer Manholes	EA	2	2,656	5,312		
33 00 00	Domestic Water Service	LF	365	15.61	5,695	2" PVC	
33 00 00	Meter Pit, Backflow Preventer	EA	1	8,299	8,299		
33 00 00	Street Crossings	EA	2	5,384	10,768		
	Total				46,043		
11	Storm Drainage Systems						
33 00 00	Storm Drainage	AC	8.49	11,371	96,510		
	Total				96,510		
12	Fire Protection						
33 00 00	Firewater Main	LF	1,216	20.00	24,322	8" PVC	
33 00 00	Fire Hydrants	EA	5	2,693	13,465		
33 00 00	Valve Pit, Backflow Preventer	EA	1	10,862	10,862		
33 00 00	Street Crossings	EA	1	7,500	7,500		
	Total				56,149		
13	Landscaping and Irrigation						
32 90 00	Sodding	AC	1.47	21,158	31,019	35% Green	
32 90 00	Seeding	AC	2.72	2,106	5,735		
32 90 00	Landscaping Allowance	SF	182,456	0.85	155,145		
32 80 00	Lawn Sprinklers	SF	182,456	0.28	50,867	Round Places	
	Total				242,765	0	
14	Electrical						
33 70 00	Telephone & Power Conduits, 4	LF	2,482	14.62	36,286		
33 70 00	LED Parking Lighting, 50% Dup	EA	8	4,279	34,234	\$3,125 Mat'l	30' Tall
33 70 00	LED Pedestrian Lighting, 12' Pc	EA	10	2,725	27,248	\$1,960 Mat'l	12' Tall
33 70 00	Lighting Conduit & Wire, 1" PVC	LF	1,343	11.53	15,486		
	Total				113,254		

**Existing Arena & Mercer Theater
Savannah, GA
February 12, 2016**

Concept Estimate Revised

**Perry Street Extension
625 LF Long, 28 Feet Wide**

<i>Item</i>	<i>Description</i>	<i>Cost</i>	<i>Cost/LF</i>
1	General Requirements	51,555	82.49
2	Public Works Permit & Bond	53,864	86.18
3	Traffic Control	43,786	70.06
4	Excavation and Grading	76,714	122.74
5	Asphalt Paving	129,109	206.57
6	Concrete Work	79,880	127.81
7	Retaining Walls	0	0.00
8	Striping and Signage	2,188	3.50
9	Storm Drainage Systems	37,879	60.61
10	Utilities	24,834	39.73
11	Landscaping	37,901	60.64
12	Electrical	36,227	57.96
13	Traffic Signals	132,052	211.28
	Subtotal	705,988	1,130
	Permits, Bonds and Insurance	37,474	60
	Contingency	0	0
	Escalation or Other	0	0
	Fee	26,021	42
	Total	\$769,483	\$1,231

Item	Description	Unit	Quantity	Price	Amount	Note	Note
2	Public Works Permit & Bond				53,864		
3	Traffic Control						
31 20 00	Misc Traffic Control	LF	280	45.43	12,721		
31 20 00	Jersey Barriers	LF	1,300	19.53	25,394		
31 20 00	Barrels and Signage	LF	625	3.84	2,400		
31 20 00	Barrels and Signage Rent	DA	78	41.88	3,271		
					43,786		
4	Excavation and Grading						
31 20 00	Site Demolition & Clearing	AC	1.26	4,957	6,258		
31 20 00	Erosion Control	AC	1.26	8,524	10,762		
31 20 00	Site Stripping	CY	1,019	0.92	935	6" Thick	150 CY/HR
31 20 00	Street Cuts & Fills	CY	4,074	8.26	33,656	2.0' Avg	50 CY/HR
31 20 00	Fly Ash Stabilization	SY	2,639	5.33	14,074	12" Thick	
31 20 00	Fine Grading	SF	55,000	0.15	8,250		
31 20 00	Respread Topsoil & Grade	CY	463	6.00	2,778		
					76,714		
5	Asphalt Paving						
32 12 00	Asphalt Street Paving	SY	2,361	54.68	129,109	9.0 Inches	12" AggBase
					129,109		
6	Concrete Work						
32 13 00	Curb & Gutter	LF	1,250	17.81	22,259	1.5#/LF	4" AggBase
32 13 00	Walks and Slabs	SF	6,250	5.03	31,417	4.0" Thick	4" AggBase
32 13 00	24"Ø Light Pole Bases	EA	6	564.31	3,538	6' High	
32 13 00	Street Layout and Cleanup	LF	625	31.63	19,766		
32 13 00	Misc Site Concrete	LS	1	2,900	2,900		
					79,880		
7	Retaining Walls				0		
8	Striping and Signage						
10 10 00	Misc Signage & Marking	LF	625	3.50	2,188		
					2,188		

Item	Description	Unit	Quantity	Price	Amount	Note	Note
9	Storm Drainage Systems						
33 00 00	Storm Drainage	AC	1.26	30,000	37,879		
					<u>37,879</u>		
10	Utilities						
33 00 00	Firewater Main Rework	LF	625	20.00	12,500	8" PVC	
33 00 00	New Fire Hydrants	EA	3	4,000	12,333		
					<u>24,834</u>		
11	Landscaping						
32 90 00	Sodding	AC	0.57	21,158	12,143		
32 90 00	Street Trees, 2 1/2"Ø	EA	50	515.16	25,758		
					<u>37,901</u>		
12	Electrical						
33 70 00	Street Lights, Single Head	EA	6	4,441	27,847	\$3,260 Mat'l	30' Tall
33 70 00	Lighting Conduit & Wire, 1" PVC	LF	757	11.07	8,380		
					<u>36,227</u>		
13	Traffic Signals						
33 70 00	Intersection Traffic Signals	EA	1	132,052	132,052		
					<u>132,052</u>		

**Existing Arena & Mercer Theater
Savannah, GA
February 12, 2016**

Concept Estimate Revised

**Mercer Theater Renovations
100,874 SF**

<i>Item</i>	<i>Description</i>	<i>Cost</i>	<i>Cost/SF</i>
1	General Requirements	1,347,937	13.36
2	Demolition and Protection	419,532	4.16
3	Structure Modifications	256,426	2.54
4	Envelope	2,066,686	20.49
5	Rough Carpentry	22,341	0.22
6	Finish Carpentry and Millwork	496,268	4.92
7	Thermal and Moisture Protection	29,190	0.29
8	Doors, Frames and Hardware	115,887	1.15
9	Glass and Glazing	1,682,786	16.68
10	Drywall Systems	766,149	7.60
11	Stone and Tile	580,765	5.76
12	Acoustical Ceilings	636,375	6.31
13	Flooring	730,047	7.24
14	Painting and Wall Coverings	403,860	4.00
15	Specialties	225,476	2.24
16	Equipment and Furnishings	1,576,075	15.62
17	Elevators	110,000	1.09
18	Fire Protection	232,513	2.30
19	Plumbing	2,324,705	23.05
20	HVAC Systems	1,591,915	15.78
21	Electrical	1,917,805	19.01
	Subtotal	<u>17,532,738</u>	<u>173.81</u>
	Permits, Bonds and Insurance	979,769	9.71
	Contingency	925,625	9.18
	Escalation or Other	0	9.18
	Fee	680,335	6.74
	Total	<u>\$20,118,468</u>	<u>\$199.44</u>

Item	Description	Unit	Quantity	Price	Amount	Cost/SF	Note
2	Demolition and Protection <i>Remove The Following:</i>						
02 40 00	Interior Partitions and Finishes	SF	100,874	2.33	234,768	75% Total Gut	
02 40 00	SOG, Neat for Plumbing	SF	5,044	6.81	34,329	Incl sawcut	5% Area
02 40 00	Remove Exterior Canopies	SF	6,084	11.21	68,194		
02 40 00	Temporary Partitions	SF	100,874	0.19	19,345		
02 40 00	Temporary Protection	LS	1	4,782	4,782		
02 40 00	Demolition Cleanup	SF	100,874	0.24	24,385		
02 40 00	Equipment & Dumpsters	%	10%		33,729		
	Total				419,532	\$4.16	
3	Structure Modifications						
03 31 00	Patch or Replace SOG	SF	5,044	7.47	37,680	4" Thick	5% Area
05 50 00	Misc or Ornamental Metals	SF	100,874	1.86	187,780	0.25 #/SF	
04 20 00	6" CMU Partitions	SF	2,304	13.44	30,967	2% Wall LF	25% Grout
	Total				256,426	\$2.54	
4	Envelope						
03 31 00	Patch & Point Exterior Brick	SF	46,200	18.00	831,600		
03 31 00	Remove & Replace Roofing	SF	68,200	17.50	1,193,500		
09 20 00	8" Structural Stud Framing	SF	4,000	7.22	28,878	16 Gauge	
09 20 00	#REF!	SF	4,000	1.36	5,440	2.0" Thick	
09 20 00	DensGlas Sheathing	SF	4,000	1.82	7,268		
	Total				2,066,686	\$20.49	
5	Rough Carpentry						
06 10 00	Misc Blocking, (1BF/LF Partitions)	BF	4,056	5.51	22,341		
	Total				22,341	\$0.22	
6	Finish Carpentry and Millwork						
06 20 00	Finish Moulding & Trim	LF	6,241	11.99	74,860		
06 20 00	Plastic Laminate Base Cabinets	LF	240	129.57	31,096		
06 20 00	Plastic Laminate Counter Tops	LF	240	44.38	10,650		
06 20 00	Plastic Laminate Upper Cabinets	LF	240	119.25	28,621		
06 20 00	Reception Casework and Countertops	LF	75	544.70	40,852	\$400 Mat'l	
06 20 00	Stone Counter Tops	LF	75	164.38	12,328	\$125 Mat'l	
06 20 00	Misc. Millwork	SF	81,974	1.12	91,455		
06 20 00	Executive Area Millwork	SF	18,900	9.86	186,404		
06 20 00	Layout and Cleanup	SF	100,874	0.20	20,002		
	Total				496,268	\$4.92	
7	Thermal and Moisture Protection						
07 10 00	Fluid Applied Membrane Air Barrier	SF	4,000	3.36	13,447		
07 80 00	Misc Fire Stopping	SF	100,874	0.00	0	Included in MEP Trades	
07 90 00	Misc Interior Caulking	SF	100,874	0.16	15,743		
	Total				29,190	\$0.29	

Item	Description	Unit	Quantity	Price	Amount	Cost/SF	Note
8	Doors, Frames and Hardware						
08 10 00	Hollow Metal Door Frames	EA	87	120.00	10,440		
08 10 00	HM SL/BL Frames, ±16 SF/EA	EA	9	300.00	2,700	10% Doors	
08 10 00	Hollow Metal Doors	EA	8	305.00	2,440		
08 10 00	7' Plastic Laminate Doors	EA	87	190.00	16,530		Includes Factory Finish
08 10 00	Smoke and Sound Door Premit	EA	4	500.00	2,000		
08 10 00	Finish Hardware, Cylinder Lock	EA	78	450.00	35,235		
08 10 00	Hinges, Locks, & Stops Only	EA	9	170.00	1,479	10% Doors	
08 10 00	Unload & Distribute Dr, Frame,	EA	87	0.00	0		
08 20 00	Doors, Frames, Hardware Insta	LS	1	45,063	45,063		
	Total				115,887	\$1.15	
9	Glass and Glazing						
08 40 00	Exterior CW @ South	SF	4,000	125.00	500,000		
08 40 00	Replace Existing Glazing	SF	6,710	125.00	838,750		
08 40 00	Interior Storefront	SF	9,218	24.85	229,062	10% Wall LF	
08 40 00	Skylights	SF	1,400	69.75	97,652		Translucent Plastic
08 40 00	Mirrors	SF	918	11.05	10,144		
08 40 00	Glaze Sidelites & Borrow Lites	SF	144	13.50	1,944		
08 40 00	Door Lites and Misc Glazing	EA	9	69.00	600	10% Doors	
08 40 00	Final Glass Cleaning	SF	44,797	0.10	4,634		
	Total				1,682,786	\$16.68	
10	Drywall Systems						
09 20 00	Partitions to Structure (One Ho	LF	3,595	130.78	470,123	78% Wall LF	
09 20 00	Partitions to Ceiling	LF	461	92.24	42,510	10% Wall LF	
09 20 00	Drywall Perimeter	SF	50,057	1.50	75,272		
09 20 00	Drywall at Columns	SF	15,243	3.17	48,363		
09 20 00	Suspended Drywall Ceilings/So	SF	15,131	4.50	68,039		15% Area
09 20 00	Drywall Bulkheads	LF	1,261	30.04	37,882		
09 20 00	Layout and Cleanup	SF	100,874	0.24	23,961		
	Total				766,149	\$7.60	
11	Stone and Tile						
09 30 00	12x12 Stone Tile Floors	SF	4,896	14.88	72,854	\$8.00 Mat'l	5% Area
09 30 00	Stone Tile Walls	SF	28,560	14.88	424,980	\$8.00 Mat'l	11% Wall
09 30 00	Quarry Tile Floors at Concessic	SF	5,000	6.90	34,507	\$2.50 Mat'l	5% Area
09 30 00	Quarry Tile Base	LF	619	9.11	5,639		5% Base
09 30 00	Wall Tile at Serving	SF	2,700	6.00	16,190	\$2.50 Mat'l	0% Wall
09 30 00	Misc Stone & Tile	SF	100,874	0.26	26,596		
	Total				580,765	\$5.76	
12	Acoustical Ceilings						
09 50 00	2x4 Acoustic Ceiling (Second L	SF	5,044	2.19	11,028		5% Area
09 50 00	2x2 Acoustic Ceiling	SF	70,612	2.93	206,681		70% Area
09 50 00	2x2 Acoustic Ceiling (Washabl	SF	5,044	3.30	16,656		5% Area
09 50 00	2x2 9/16" Grid Tegular Acoustic	SF	18,900	3.94	74,390		19% Area
09 50 00	Sound Batts	SF	18,900	0.46	8,769		
09 50 00	Acoustic Wall Panels	SF	24,965	12.77	318,852	\$30/LY Mat'l	10% Wall
	Total				636,375	\$6.31	

Item	Description	Unit	Quantity	Price	Amount	Cost/SF	Note
13	Flooring						
09 60 00	LVT Flooring, 18" x 18"	SF	30,262	6.30	190,600	\$4.25 Mat'l	30% Area
09 60 00	Carpet Tiles	SY	8,003	31.08	248,688	\$22.00 Mat'l	68% Area
09 69 00	Access Flooring	SF	2,017	5.96	12,025	6.0 Inches	2% Area
09 69 00	Access Flooring Cleaning	EA	2,017	0.23	466		
09 60 00	Floor Preparation	SF	98,857	1.62	160,034		98% Area
09 60 00	Floor Protection	SF	30,262	2.63	79,604		30% Area
09 60 00	4" Resilient Base	LF	8,743	1.68	14,679		70% Base
06 20 00	6" Wood Base, One Piece	LF	3,121	7.68	23,952		25% Base
	Total				730,047	\$7.24	
14	Painting and Wall Coverings						
09 90 00	Finish Doors & Frames	EA	96	46.39	4,453		
09 90 00	Paint Drywall Walls	SF	33,853	0.45	15,209		14% Wall
09 90 00	Polymix Wall Coatings	SF	62,413	1.60	100,103	\$1.00 Mat'l	25% Wall
09 90 00	Vinyl Wall Coverings	SF	124,827	1.82	227,790	\$1.00 Mat'l	50% Wall
09 90 00	Painted Ceilings	SF	16,392	0.58	9,571		
09 90 00	Finish Molding and Trim	LF	9,362	0.80	7,535		
09 90 00	Final Cleanup and Punchlist	SF	100,874	0.20	19,999		
09 90 00	Misc. Items	LS	1	19,200	19,200		5%
	Total				403,860	\$4.00	
15	Specialties						
10 10 00	Audio/Visual Units	EA	4	1,373	5,490		
11 52 00	Projection Screens	EA	4	2,486	9,945		
10 10 00	Door Signage	EA	87	29.38	2,556		
10 40 00	Fire Extinguishers and Cabinet	EA	7	193.13	1,352		
10 22 00	New Fire Curtain at Stage	SF	1,250	128.70	160,870	25' High	
10 28 00	Single Toilet Toilet Accessories	EA	102	326.26	33,279		
10 21 00	Shower Enclosures	EA	8	576.02	4,608		
10 10 00	Misc Specialties	SF	100,874	0.07	7,377		
	Total				225,476	\$2.24	
16	Equipment and Furnishings						
11 30 00	Ice Makers	EA	4	782.99	3,132		
11 30 00	Refrigerators; 25 CF	EA	4	1,874	7,497		
11 30 00	Microwave Ovens, Undercount	EA	4	403.13	1,613		
11 40 00	Concession Equipment	SF	5,000	76.75	383,726		
11 52 00	Projection Screens	EA	4	2,486	9,945		
11 61 00	Rigging and Stage Equipment	Allw	1	500,000	500,000		
12 30 00	Vanity Cabinets	LF	306	111.57	34,139		
12 30 00	Vanity Tops 2 cm Granite	LF	306	108.96	33,342		
12 60 00	Remove & Replace Theater Se	EA	2,600	231.80	602,681		
	Total				1,576,075	\$15.62	
17	Elevators						
14 20 00	New Elevators in Existing Shaft	EA	2	55,000	110,000		
	Total				110,000	\$1.09	

Item	Description	Unit	Quantity	Price	Amount	Cost/SF	Note
18	Fire Protection						
21 00 00	Relocate/Add Sprinkler Heads	SF	100,874	2.24	226,236		
21 00 00	Pre-Action System @ Compute	SF	2,017	3.11	6,278		
	Total				232,513	\$2.30	
19	Plumbing						
22 00 00	Plumbing Risers (DWV, HW, CV)	LF	11,925	144.14	1,718,883		
22 00 00	Concession Plumbing	EA	4	3,140	12,561		Sink, Icemaker & DW Hookup
22 00 00	Plumbing	FX	204	2,490	508,014		
22 00 00	Concession Plumbing	SF	5,000	11.29	56,467		
22 00 00	Kitchen Equipment Hookup	LS	1	28,779	28,779		
	Total				2,324,705	\$23.05	
20	HVAC Systems						
23 00 00	Central Chiller Plant & Cooling	TN	700	1,094	765,924		
23 00 00	Air Handling Units	CFM	150,000	3.39	508,709	\$2.64 /CFM Equip	
23 00 00	FPVAV Boxes, Elec Heat	EA	28	780.00	21,691		
23 00 00	Interior VAV Boxes	EA	50	780.00	39,341		
23 00 00	Temperature Controls	SF	100,874	1.71	172,446		
23 00 00	Test and Balance	SF	100,874	0.14	14,028		
23 00 00	Kitchen Make Up Air & Exhaust	LS	1	38,373	38,373		
23 00 00	Liebert PBX/Computer Rm Unit	TN	15	2,094	31,404		
	Total				1,591,915	\$15.78	

Item	Description	Unit	Quantity	Price	Amount	Cost/SF	Note
21	Electrical						
26 00 00	480V Service Entrance & Switc	AMP	5,000	41.89	209,451		
26 00 00	Power Distribution	SF	100,874	1.59	160,495		
26 00 00	Hookup Liebert Units	TN	15	126.21	1,893		
26 00 00	Hookup Fan Powered Boxes	EA	28	495.52	13,780		
26 00 00	General Lighting Installation	EA	189	140.43	26,561	80 SF/EA	
26 00 00	Parabolic Light Fixtures	EA	189	144.00	27,236	\$120 /Fixture	
26 00 00	Lighting @ Unfinished Areas	SF	5,000	0.65	3,266	400 SF/EA	
26 00 00	Direct/Indirect Lighting	LF	5,044	75.64	381,514	85% Area	\$50.00/LF
26 00 00	Ballroom Area Lighting Premiur	SF	18,900	7.50	141,750		
26 00 00	Theater Sound & Lighting	Allw	1	350,000	350,000		
26 00 00	Refurbish Exterior Lighting	Allw	1	75,000	75,000		
26 00 00	Emergency and Exit Lighting	SF	100,874	0.23	23,201		
26 00 00	Tenant Switches	EA	95	124.66	11,789		
26 00 00	Motion Sensor Switches	EA	86	189.10	16,214		
26 00 00	Wall Outlets, MC Cable	EA	484	88.24	42,674	188 SF/EA	
26 00 00	Floor Outlets, Poke-Thru	EA	54	475.97	25,577	10%	
26 00 00	Workstations, 8 Wire Wall	EA	64	338.82	21,788	1086 SF/EA	6 Cubes
26 00 00	Workstations, 8 Wire Floor	EA	29	475.97	13,604	10%	
26 00 00	Dedicated Circuits	EA	6	399.25	2,396		
26 00 00	Telephone/Data Outlets	EA	1,680	63.10	105,987	54 SF/EA	
26 00 00	Telephone/Data Floor Outlets	EA	187	327.31	61,082	10%	
26 00 00	Relocate Existing Generator	Allw	1	75,000	75,000	0.00 Watts/SF	
28 00 00	Life Safety Systems	SF	100,874	0.90	90,787		
27 00 00	Paging/Music System	SF	100,874	0.00		0 With Phones ?	
26 00 00	Special Systems Conduit	SF	100,874	0.17	17,573		
26 00 00	Kitchen Equipment Hookup	LS	1	19,186	19,186		
27 00 00	Telephone System Allowance	LS	1	0.00	Exclude		
	Total				1,917,805	\$19.01	

**Existing Arena & Mercer Theater
Savannah, GA
February 12, 2016**

Concept Estimate Revised



**South Restroom & Canopy Addition
4,000 SF**

<i>Item</i>	<i>Description</i>	<i>Cost</i>	<i>Cost/SF</i>
1	General Requirements	0	0.00
2	Demolition	0	0.00
3	Excavation	8,426	2.11
4	Structure	278,855	69.71
5	Enclosure	133,046	33.26
6	Rough Carpentry	8,257	2.06
7	Finish Carpentry	2,454	0.61
8	Roofing and Sheet Metal	60,642	15.16
9	Thermal and Moisture Protection	13,637	3.41
10	Doors and Hardware	20,016	5.00
11	Glass and Glazing	142,788	35.70
12	Interior Partitions	50,023	12.51
13	Stone and Tile	35,179	8.79
14	Ceilings and Acoustic	23,828	5.96
15	Flooring	2,161	0.54
16	Painting	11,608	2.90
17	Specialties	15,955	3.99
18	Equipment and Furnishings	0	0.00
19	Special Construction	0	0.00
20	Elevators	0	0.00
21	Fire Protection	5,712	1.43
22	Plumbing	84,057	21.01
23	HVAC Systems	28,962	7.24
24	Electrical	51,553	12.89
	Subtotal	<u>977,157</u>	<u>244.29</u>
	Permits, Bonds and Insurance	51,867	12.97
	Contingency	0	0.00
	Escalation or Other	0	0.00
	Fee	36,016	9.00
	Total	<u>\$1,065,041</u>	<u>\$266.26</u>

Skin/Floor Area Ratio 189%
Glass/Skin Area Ratio 15%

Total Skin Cost, Contact Area \$37.79 /SF
Skin Cost, Bldg Area \$68.96 /SF

Item	Description	Unit	Quantity	Price	Amount	Cost/SF	Note
2	Demolition						
		Total			0	\$0.00	
3	Excavation						
31 20 00	Machine Excavation	CY	89	2.75	245	1.0' Avg	50 CY/HR
31 20 00	Haul Surplus Earth	CY	117	11.96	1,398		10 CY/HR
31 20 00	Grade Beam & Ftg Excavate	CY	118	11.10	1,315	0% Rock	
31 20 00	Select Fill Cap at SOG	CY	37	35.61	1,319	6" Thick	
31 20 00	Compacted Earth Backfill	CY	90	7.76	701		
03 31 00	Hand Grade and Pump Water	SF	2,000	0.44	887		
03 31 00	Utility Loader & Operator	WK	0.16	7,137	1,142		
31 31 00	Soil Poisoning	SF	4,400	0.08	362		
31 20 00	Finish Grading	SF	9,600	0.11	1,057	1,500 SF/HR	
		Total			8,426	\$2.11	
4	Structure						
03 31 00	Column Footings	CY	90	386.52	34,943	115 #/CY	2.5 Kips
03 31 00	Grade Beams; 2' x 1.5'	CY	28	365.97	10,247	100 #/CY	Form 50%
03 31 00	Perimeter Foundation Insulation	SF	840	1.30	1,096	2.0" Thick	
03 31 00	Slab on Grade	SF	2,000	4.39	8,778		4.0" Thick
03 32 00	Concrete Columns	CY	18	875.62	15,862	202 #/CY	10.0 SF/LH
03 32 00	Conc Wide Module Pan Slab	SF	9,000	20.53	184,743	5.0 #/SF	10.0" Thick
05 50 00	Suspended Masonry Supports	LF	204	48.23	9,838		
05 50 00	Other Miscellaneous Steel	TN	0	5,289	1,058	0.10 #/SF	
03 31 00	Foundation and Misc Hoisting	WK	1	8,940	8,940	65T RT	
03 80 00	Crane In/Out and Up/Down	LS	1	0.00	0		
03 80 00	Crane In/Out and Up/Down	LS	1	0.00	0		
03 31 00	Layout and Cleanup	SF	4,000	0.20	793		
03 32 00	Weather Conditions	LS	1.00%		2,557		
		Total			278,855	\$69.71	
5	Enclosure						
04 20 00	Modular Brick	SF	3,213	18.96	60,907		
09 20 00	6" Structural Stud Framing	SF	6,426	5.55	35,687	16 Gauge	
09 20 00	DensGlas Sheathing	SF	6,426	1.82	11,675		
09 20 00	Exterior Wall Furring	SF	351	1.34	468		
09 20 00	Ext Stud Insul, Mineral Fiber	SF	3,213	3.47	11,142	3.5" Thick	
09 20 00	Furring Insul, Rigid Styrofoam	SF	351	1.36	477	2.0" Thick	
09 20 00	Perimeter Drywall	SF	6,777	1.50	10,190		
09 20 00	Building Skin Review	LS	1	2,500	2,500		
		Total			133,046	\$33.26	

Item	Description	Unit	Quantity	Price	Amount	Cost/SF	Note
6	Rough Carpentry						
06 10 00	Roof Blocking	BF	875	6.22	5,443	2.0 BF/LF Parapet	
06 10 00	Plywood at Parapet	SF	600	3.89	2,332		
06 10 00	Interior Blocking	SF	4,000	0.00	0		
06 10 00	Layout and Cleanup	SF	4,000	0.12	483		
	Total				8,257	\$2.06	
7	Finish Carpentry						
06 20 00	2 cm Granite Vanities	LF	18	130.75	2,354	at Public Toilets	
06 20 00	Misc. Items	LS	1	100.00	100		
	Total				2,454	\$0.61	
8	Roofing and Sheet Metal						
07 50 00	TPO Mech Attached Membrane	SF	7,000	6.64	46,483	R30 60 mil	
07 50 00	Roof Crickets, Interior	SF	350	4.43	1,551	5% Roof	
07 50 00	Membrane Parapet Flashing	SF	600	4.03	2,416		
07 60 00	Sheet Metal Flashings	LF	437	21.19	9,270		
07 60 00	Overflow Roof Scuppers	EA	4	229.07	802		
07 60 00	Misc Items	LS	1	120.00	120		
	Total				60,642	\$15.16	
9	Thermal and Moisture Protection						
07 10 00	Fluid Applied Membrane Air Barr	SF	3,213	2.78	8,920	Not req'd if ext spray foam	
07 10 00	Transition Flashings at Glazing	LF	262	4.20	1,099		
07 80 00	Misc Fire Stopping	SF	4,000	0.00	0	Included in MEP Trades	
07 90 00	Building Skin & Window Caulking	LF	1,714	2.04	3,498		
07 90 00	Misc Caulking	LS	1	120.00	120		
	Total				13,637	\$3.41	
10	Doors and Hardware						
08 10 00	Hollow Metal Frames, Welded	EA	16	230.26	3,684		
08 10 00	7' Plastic Laminate Doors	EA	16	314.26	5,028	Includes Factory Finish	
08 70 00	Finish Hardware, Cylinder Locks	EA	16	669.39	10,710		
08 70 00	Unload & Distribute Dr, Frame, f	EA	16	37.08	593		
	Total				20,016	\$5.00	
11	Glass and Glazing						
08 40 00	Curtainwall	SF	1,134	125.00	141,750		
08 40 00	Mirrors	SF	72	11.05	796		
08 40 00	Final Glass Cleaning	SF	2,340	0.10	242		
	Total				142,788	\$35.70	

Item	Description	Unit	Quantity	Price	Amount	Cost/SF	Note
12	Interior Partitions						
09 20 00	Shaft Wall, Incl Fire Caulk	LF	76	79.13	6,014		
09 20 00	One Hour Walls and Fire Caulk	LF	542	64.47	34,944	50% Sound Batts	
09 20 00	One Sided Wall & Bridging Prem	LF	26	26.95	701		
09 20 00	Drywall at Columns	SF	1,767	3.17	5,607	2.5 Ft Square	
07 80 00	Safing Insulation	LF	240	8.05	1,931		
09 20 00	Layout and Cleanup	SF	4,000	0.21	826		
	Total				50,023	\$12.51	
13	Stone and Tile						
09 30 00	Stone Tile	SF	966	14.57	14,078	\$8.00 Mat'l	35% Area
09 30 00	Stone Tile Walls	SF	1,448	14.57	21,102	\$8.00 Mat'l	8% Area
	Total				35,179	\$8.79	
14	Ceilings and Acoustic						
09 20 00	Suspended Drywall Ceilings	SF	2,092	4.85	10,151		75% Area
09 20 00	Drywall Bulkheads	LF	422	27.19	11,473		
09 50 00	2x2 Acoustic Ceilings	SF	697	3.16	2,204	\$1.78 Mat'l	25% Area
	Total				23,828	\$5.96	
15	Flooring						
09 90 00	Unfinished Exposed Floors	SF	1,265	0.00	0		45% Area
09 60 00	Carpet Tiles	SY	68	31.70	2,161	\$22.00 Mat'l	20% Area
	Total				2,161	\$0.54	
16	Painting						
09 90 00	Finish Doors and Frames	EA	16	46.39	742		Door/frame counts as 2
09 90 00	Paint Drywall Walls	SF	18,795	0.45	8,444		100% Wall
09 90 00	Drywall Ceilings	SF	2,514	0.54	1,347		
09 90 00	Misc. Items	LS	1	200.00	200		
09 90 00	Final Cleanup and Punchlist	SF	4,000	0.22	875		
	Total				11,608	\$2.90	
17	Specialties						
10 14 00	Door Signs	EA	16	39.57	633		
10 21 00	Toilet Partitions	EA	12	723.36	8,680		
10 40 00	Fire Extinguishers and Cabinets	EA	2	193.13	386		
10 28 00	Toilet Accessories Public Toilets	EA	8	756.87	6,055		
10 00 00	Misc. Items	LS	1	200.00	200		
	Total				15,955	\$3.99	
18	Equipment and Furnishings						
11 00 00	Misc Equipment	LS	1	0.00	0		
	Total				0	\$0.00	

Item	Description	Unit	Quantity	Price	Amount	Cost/SF	Note
21	Fire Protection						
21 00 00	Sprinklers	SF	4,000	1.43	5,712		
	Total				5,712	\$1.43	
22	Plumbing						
22 00 00	Backflow Preventer	EA	1	0.00	0	See Sitework	
22 00 00	Roof Drains	EA	4	497.54	1,990	2,000 SF per Drain	
22 00 00	Roof Drain Piping	LF	73	47.52	3,456	6"Ø Pipe Avg Size	
22 00 00	Sewer & Water Mains	LF	80	172.84	13,827	Incl Excavation/Backfill	
22 00 00	Plumbing Risers (DWV, HW, CW)	LF	56	144.14	8,072		
22 00 00	Wet Columns - HW,CW,SD,SV	EA	2	4,036	8,072		
22 00 00	Plumbing Fixtures	EA	15	2,546	39,202		
22 00 00	Motion Sensor Valves	EA	12	277.85	3,334		
22 00 00	Floor Drains	EA	6	321.70	1,930		
22 00 00	Roof Drain Insulation	%	10%		545		
22 00 00	Plbg Fixture Insulation	EA	15	235.62	3,629		
	Total				84,057	\$21.01	
23	HVAC Systems						
23 00 00	Remote Chiller Plant	TN	20	346.11	6,922	Includes Plant Piping	
23 00 00	Toilet & Janitor Exhaust	EA	6	355.85	2,135		
23 00 00	Sheet Metal Duct/GRD's	SF	4,000	2.09	8,367	25% Fittings 0.2 #/SF	
23 00 00	15 KW Elec FPVAV Boxes	EA	5	960.00	5,120		
23 00 00	Temperature Controls	SF	4,000	0.99	3,959		
23 00 00	Test and Balance	SF	4,000	0.15	600		
23 00 00	Sheet Metal Insulation	SF	4,000	0.31	1,238		
23 00 00	System Validation	SF	4,000	0.16	621		
	Total				28,962	\$7.24	
24	Electrical						
26 00 00	Power Distribution System	SF	4,000	1.31	5,227	5,227	
26 00 00	HVAC Hookup	TN	20	30.78	616		
26 00 00	Fan Powered VAV Box Hookup	EA	5	456.42	2,434		
26 00 00	Plumbing Motion Sensor Hookup	EA	12	128.43	1,541		
26 00 00	Lighting and Power at Core Area	SF	966	6.76	6,526		
26 00 00	Exit & Egress Lighting	SF	4,000	0.19	747		
26 00 00	Canopy and Soffit Lighting	SF	5,000	5.70	28,514		
26 00 00	Light Switches	EA	2	110.50	221	150%	
26 00 00	Motion Sensor Light Controls	EA	1	187.12	187	50%	
	<i>Special Systems</i>						
28 00 00	Life Safety Systems	SF	4,000	0.44	1,743		
26 00 00	Special Systems Conduit	SF	4,000	0.07	285		
26 00 00	Temporary Wiring	SF	4,000	0.00	0		
26 00 00	System Validation	SF	4,000	0.23	912		
26 00 00	Temporary Power Bills	SF	4,000	0.65	2,600		
	Total				51,553	\$12.89	

EXISTING BUILDINGS
WITH ARENA
RENOVATION
COST ESTIMATE

**Existing Arena & Mercer Theater
Savannah, GA
February 12, 2016**

Concept Estimate Revised

Total Project Summary Worksheet

<i>Description</i>	<i>Area</i>	<i>Cost</i>	<i>Cost/SF</i>
Total Construction Cost	185,098 SF	\$47,571,332	\$257.01

The following items are those normally provided by the owner during the course of the project. These costs are not included in the construction estimate.

Site Acquisition Cost		Included below
Offsite Utility Relocation Cost		By Others
Hazardous Materials Abatement (if any)		Included below
Street Improvements (if required)		By Others
Special Assessments or Development Fees		Included below
Site Survey		Included below
Soil Borings and Report		Included below
Architect and Engineer's Fees		Included below
Drawing Reproduction Costs		Included below
Testing and Inspections		Included below
Furnishings Fixtures & Equipment (FF&E)		Included below
Basketball Court / Goals		Included below
Artwork		Included below
Telephone System		Included below
Moving Expenses		Included below
Financing Costs		NA
Legal Fees		Included below
Owner Soft Cost Allowance	25%	\$11,892,833
Owner's Contingency		Included Above

Total Project Cost

\$59,464,164

**Existing Arena & Mercer Theater
Savannah, GA
February 12, 2016**

Concept Estimate Revised

Arena Stays Construction Cost Summary

<i>Description</i>	<i>Quantity</i>	<i>Cost</i>	<i>Unit Cost</i>
Offsite Improvements		By Others	
Arena Stays Site	5.30 Acre	926,388	174,742
Arena Stays Mercer Theater Renovat	100,874 SF	19,206,789	190.40
Existing Arena Renovations	84,224 SF	18,891,706	224.30
Construction Subtotal	185,098 SF	39,024,882	\$210.83
Design Fees and Reimbursables	0%	0	0.00
Design & Estimating Contingency	10%	3,902,488	21.08
Construction Contingency	5%	1,951,244	10.54
Escalation to 2nd Qtr 2017	6%	2,692,717	14.55
Total Construction Cost	185,098 SF	\$47,571,332	\$257.01

**Existing Arena & Mercer Theater
Savannah, GA
February 12, 2016**

Concept Estimate Revised

Arena Stays Site

<i>Item</i>	<i>Description</i>	<i>Cost</i>
1	General Requirements	62,068
2	Excavation and Grading	163,372
3	Asphalt Paving	233,757
4	Concrete Work	78,716
5	Site Structures	0
6	Fencing	0
7	Specialty Paving	0
8	Signage and Striping	29,824
9	Site Specialties	19,461
10	Site Utilities	38,845
11	Storm Drainage Systems	60,285
12	Fire Protection	48,357
13	Landscaping and Irrigation	21,637
14	Electrical	93,624
	Subtotal	849,946
	Permits, Bonds and Insurance	45,115
	Contingency	0
	Escalation or Other	0
	Fee	31,327
	Total	\$926,388

Item	Description	Unit	Quantity	Price	Amount	Note	Note
2	Excavation and Grading						
31 20 00	Site Demolition & Clearing	AC	5.30	5,507	29,197	1% Green Area	
31 20 00	Temporary Erosion Control	AC	5.30	3,021	16,014		
31 20 00	Site Stripping	CY	4,277	0.92	3,925	6" Thick	150 CY/HR
31 20 00	Site Cuts	CY	4,277	8.26	35,328	0.5' Avg	50 CY/HR
31 20 00	Site Fills	CY	4,277	4.13	17,664	0.5' Avg	100 CY/HR
31 20 00	Fine Grading	SF	230,932	0.07	15,898	2,000 SF/HR	
31 20 00	Respread Topsoil & Grade	CY	43	3.41	146	6" Thick	25 CY/HR
31 20 00	Temporary Roads and Parking	SF	46,800	0.64	30,095	6" Thick	
31 20 00	Temporary Fencing	LF	2,324	6.50	15,105		
	Total				163,372		
3	Asphalt Paving						
32 12 00	Full Thick Asphalt Parking, 6"	SY	3,600	25.49	91,766	6.0 Inches	
32 12 00	Full Thick Asphalt Drives, 8"	SY	4,178	33.99	141,991	8.0 Inches	
	Total				233,757		
4	Concrete Work						
32 13 00	Curb & Gutter	LF	1,361	15.87	21,598		
32 13 00	Walks and Slabs	SF	5,000	5.03	25,134	4.0" Thick	4"AggBase
32 13 00	Drive Entrances	SF	900	5.78	5,199		0"AggBase
07 90 00	Caulk Exterior Slabs	LF	908	1.68	1,526		
32 13 00	6" Protection Bollards	EA	8	269.10	2,153		
32 13 00	24"Ø Light Pole Bases	EA	8	564.31	4,514	6' High	
32 13 00	12"Ø Pedestrian Light and Bollards	EA	5	274.80	1,374	3' High	
32 13 00	Misc Site Concrete	LS	1	3,000	3,000		
32 13 00	Site Layout and Misc Cleanup	DA	21	690.10	14,218		
	Total				78,716		
5	Site Structures						
	Total				0		
6	Fencing						
	Total				0		

Item	Description	Unit	Quantity	Price	Amount	Note	Note
7	Specialty Paving						
	Total				0		
8	Signage and Striping						
10 10 00	Monument Sign	LS	1	24,517	24,517		
10 10 00	Misc Signage	EA	15	171.42	2,492		
10 10 00	Striping & Marking	EA	194	6.39	1,241		
10 10 00	Striping Handicap Parking	EA	6	19.18	115		
10 10 00	Painted Curbs & Stencils	LF	340	4.29	1,460	25%	
	Total				29,824		
9	Site Specialties						
32 30 00	Site Furniture Allowance	LS	1	0.00	0		
10 70 00	Flagpoles	EA	2	3,071	6,143		
32 30 00	Trash Enclosure, Single	EA	1	13,318	13,318		
	Total				19,461		
10	Site Utilities						
33 00 00	Sanitary Sewer	LF	288	43.77	12,621	6 Feet Deep	8" HDPE
33 00 00	Sanitary Sewer Manholes	EA	1	2,656	2,656		
33 00 00	Domestic Water Service	LF	288	15.61	4,501	2" PVC	
33 00 00	Meter Pit, Backflow Preventer	EA	1	8,299	8,299		
33 00 00	Street Crossings	EA	2	5,384	10,768		
	Total				38,845		
11	Storm Drainage Systems						
33 00 00	Storm Drainage	AC	5.30	11,371	60,285		
	Total				60,285		
12	Fire Protection						
33 00 00	Firewater Main	LF	961	20.00	19,223	8" PVC	
33 00 00	Fire Hydrants	EA	4	2,693	10,772		
33 00 00	Valve Pit, Backflow Preventer	EA	1	10,862	10,862		
33 00 00	Street Crossings	EA	1	7,500	7,500		
	Total				48,357		
13	Landscaping and Irrigation						
32 90 00	Sodding	AC	0.05	21,158	1,122	100% Green	
32 90 00	Landscaping Allowance	SF	2,309	7.30	16,865		
32 80 00	Lawn Sprinklers	SF	2,309	1.58	3,650	Round Places	
	Total				21,637	0	
14	Electrical						
33 70 00	Telephone & Power Conduits, 4	LF	2,253	14.62	32,931		
33 70 00	LED Parking Lighting, 50% Dup	EA	8	4,279	34,234	\$3,125 Mat'l	30' Tall
33 70 00	LED Pedestrian Lighting, 12' Pc	EA	5	2,725	13,624	\$1,960 Mat'l	12' Tall
33 70 00	Lighting Conduit & Wire, 1" PV	LF	1,113	11.53	12,834		
	Total				93,624		

**Existing Arena & Mercer Theater
Savannah, GA
February 12, 2016**

Concept Estimate Revised

**Arena Stays Mercer Theater Renovations
100,874 SF**

<i>Item</i>	<i>Description</i>	<i>Cost</i>	<i>Cost/SF</i>
1	General Requirements	1,286,855	12.76
2	Demolition and Protection	318,694	3.16
3	Structure Modifications	256,426	2.54
4	Envelope	1,948,375	19.31
5	Rough Carpentry	22,341	0.22
6	Finish Carpentry and Millwork	496,268	4.92
7	Thermal and Moisture Protection	15,743	0.16
8	Doors, Frames and Hardware	115,887	1.15
9	Glass and Glazing	1,181,958	11.72
10	Drywall Systems	766,149	7.60
11	Stone and Tile	580,765	5.76
12	Acoustical Ceilings	636,375	6.31
13	Flooring	730,047	7.24
14	Painting and Wall Coverings	403,860	4.00
15	Specialties	225,476	2.24
16	Equipment and Furnishings	1,576,075	15.62
17	Elevators	110,000	1.09
18	Fire Protection	232,513	2.30
19	Plumbing	2,324,705	23.05
20	HVAC Systems	1,591,915	15.78
21	Electrical	1,917,805	19.01
	Subtotal	<u>16,738,233</u>	<u>165.93</u>
	Permits, Bonds and Insurance	935,371	9.27
	Contingency	883,680	8.76
	Escalation or Other	0	8.76
	Fee	649,505	6.44
	Total	<u>\$19,206,789</u>	<u>\$190.40</u>

Item	Description	Unit	Quantity	Price	Amount	Cost/SF	Note
2	Demolition and Protection <i>Remove The Following:</i>						
02 40 00	Interior Partitions and Finishes	SF	100,874	2.09	211,291	75% Total Gut	
02 40 00	SOG, Neat for Plumbing	SF	5,044	6.81	34,329	Incl sawcut	5% Area
02 40 00	Temporary Partitions	SF	100,874	0.19	19,345		
02 40 00	Temporary Protection	LS	1	4,782	4,782		
02 40 00	Demolition Cleanup	SF	100,874	0.24	24,385		
02 40 00	Equipment & Dumpsters	%	10%		24,562		
	Total				318,694	\$3.16	
3	Structure Modifications						
03 31 00	Patch or Replace SOG	SF	5,044	7.47	37,680	4" Thick	5% Area
05 50 00	Misc or Ornamental Metals	SF	100,874	1.86	187,780	0.25 #/SF	
04 20 00	6" CMU Partitions	SF	2,304	13.44	30,967	2% Wall LF	25% Grout
	Total				256,426	\$2.54	
4	Envelope						
03 31 00	Patch & Point Exterior Brick	SF	41,938	18.00	754,875		
03 31 00	Remove & Replace Roofing	SF	68,200	17.50	1,193,500		
	Total				1,948,375	\$19.31	
5	Rough Carpentry						
06 10 00	Misc Blocking, (1BF/LF Partitions)	BF	4,056	5.51	22,341		
	Total				22,341	\$0.22	
6	Finish Carpentry and Millwork						
06 20 00	Finish Moulding & Trim	LF	6,241	11.99	74,860		
06 20 00	Plastic Laminate Base Cabinets	LF	240	129.57	31,096		
06 20 00	Plastic Laminate Counter Tops	LF	240	44.38	10,650		
06 20 00	Plastic Laminate Upper Cabinets	LF	240	119.25	28,621		
06 20 00	Reception Casework and Countertops	LF	75	544.70	40,852	\$400 Mat'l	
06 20 00	Stone Counter Tops	LF	75	164.38	12,328	\$125 Mat'l	
06 20 00	Misc. Millwork	SF	81,974	1.12	91,455		
06 20 00	Executive Area Millwork	SF	18,900	9.86	186,404		
06 20 00	Layout and Cleanup	SF	100,874	0.20	20,002		
	Total				496,268	\$4.92	
7	Thermal and Moisture Protection						
07 80 00	Misc Fire Stopping	SF	100,874	0.00		0 Included in MEP Trades	
07 90 00	Misc Interior Caulking	SF	100,874	0.16	15,743		
	Total				15,743	\$0.16	

Item	Description	Unit	Quantity	Price	Amount	Cost/SF	Note
8	Doors, Frames and Hardware						
08 10 00	Hollow Metal Door Frames	EA	87	120.00	10,440		
08 10 00	HM SL/BL Frames, ±16 SF/EA	EA	9	300.00	2,700	10% Doors	
08 10 00	Hollow Metal Doors	EA	8	305.00	2,440		
08 10 00	7' Plastic Laminate Doors	EA	87	190.00	16,530		Includes Factory Finish
08 10 00	Smoke and Sound Door Premit	EA	4	500.00	2,000		
08 10 00	Finish Hardware, Cylinder Lock	EA	78	450.00	35,235		
08 10 00	Hinges, Locks, & Stops Only	EA	9	170.00	1,479	10% Doors	
08 10 00	Unload & Distribute Dr, Frame,	EA	87	0.00	0		
08 20 00	Doors, Frames, Hardware Inst	LS	1	45,063	45,063		
	Total				115,887	\$1.15	
9	Glass and Glazing						
08 40 00	Replace Existing Glazing	SF	6,710	125.00	838,750		
08 40 00	Interior Storefront	SF	9,218	24.85	229,062	10% Wall LF	
08 40 00	Skylights	SF	1,400	69.75	97,652		Translucent Plastic
08 40 00	Mirrors	SF	918	11.05	10,144		
08 40 00	Glaze Sidelites & Borrow Lites	SF	144	13.50	1,944		
08 40 00	Door Lites and Misc Glazing	EA	9	69.00	600	10% Doors	
08 40 00	Final Glass Cleaning	SF	36,797	0.10	3,806		
	Total				1,181,958	\$11.72	
10	Drywall Systems						
09 20 00	Partitions to Structure (One Ho	LF	3,595	130.78	470,123	78% Wall LF	
09 20 00	Partitions to Ceiling	LF	461	92.24	42,510	10% Wall LF	
09 20 00	Drywall Perimeter	SF	50,057	1.50	75,272		
09 20 00	Drywall at Columns	SF	15,243	3.17	48,363		
09 20 00	Suspended Drywall Ceilings/So	SF	15,131	4.50	68,039		15% Area
09 20 00	Drywall Bulkheads	LF	1,261	30.04	37,882		
09 20 00	Layout and Cleanup	SF	100,874	0.24	23,961		
	Total				766,149	\$7.60	
11	Stone and Tile						
09 30 00	12x12 Stone Tile Floors	SF	4,896	14.88	72,854	\$8.00 Mat'l	5% Area
09 30 00	Stone Tile Walls	SF	28,560	14.88	424,980	\$8.00 Mat'l	11% Wall
09 30 00	Quarry Tile Floors at Concessic	SF	5,000	6.90	34,507	\$2.50 Mat'l	5% Area
09 30 00	Quarry Tile Base	LF	619	9.11	5,639		5% Base
09 30 00	Wall Tile at Serving	SF	2,700	6.00	16,190	\$2.50 Mat'l	0% Wall
09 30 00	Misc Stone & Tile	SF	100,874	0.26	26,596		
	Total				580,765	\$5.76	

Item	Description	Unit	Quantity	Price	Amount	Cost/SF	Note
12	Acoustical Ceilings						
09 50 00	2x4 Acoustic Ceiling (Second L	SF	5,044	2.19	11,028		5% Area
09 50 00	2x2 Acoustic Ceiling	SF	70,612	2.93	206,681		70% Area
09 50 00	2x2 Acoustic Ceiling (Washabl	SF	5,044	3.30	16,656		5% Area
09 50 00	2x2 9/16" Grid Tegular Acoustic	SF	18,900	3.94	74,390		19% Area
09 50 00	Sound Batts	SF	18,900	0.46	8,769		
09 50 00	Acoustic Wall Panels	SF	24,965	12.77	318,852	\$30/LY Matl	10% Wall
	Total				636,375	\$6.31	
13	Flooring						
09 60 00	LVT Flooring, 18" x 18"	SF	30,262	6.30	190,600	\$4.25 Mat'l	30% Area
09 60 00	Carpet Tiles	SY	8,003	31.08	248,688	\$22.00 Mat'l	68% Area
09 69 00	Access Flooring	SF	2,017	5.96	12,025	6.0 Inches	2% Area
09 69 00	Access Flooring Cleaning	EA	2,017	0.23	466		
09 60 00	Floor Preparation	SF	98,857	1.62	160,034		98% Area
09 60 00	Floor Protection	SF	30,262	2.63	79,604		30% Area
09 60 00	4" Resilient Base	LF	8,743	1.68	14,679		70% Base
06 20 00	6" Wood Base, One Piece	LF	3,121	7.68	23,952		25% Base
	Total				730,047	\$7.24	
14	Painting and Wall Coverings						
09 90 00	Finish Doors & Frames	EA	96	46.39	4,453		
09 90 00	Paint Drywall Walls	SF	33,853	0.45	15,209		14% Wall
09 90 00	Polymix Wall Coatings	SF	62,413	1.60	100,103	\$1.00 Mat'l	25% Wall
09 90 00	Vinyl Wall Coverings	SF	124,827	1.82	227,790	\$1.00 Mat'l	50% Wall
09 90 00	Painted Ceilings	SF	16,392	0.58	9,571		
09 90 00	Finish Molding and Trim	LF	9,362	0.80	7,535		
09 90 00	Final Cleanup and Punchlist	SF	100,874	0.20	19,999		
09 90 00	Misc. Items	LS	1	19,200	19,200		5%
	Total				403,860	\$4.00	
15	Specialties						
10 10 00	Audio/Visual Units	EA	4	1,373	5,490		
11 52 00	Projection Screens	EA	4	2,486	9,945		
10 10 00	Door Signage	EA	87	29.38	2,556		
10 40 00	Fire Extinguishers and Cabinet	EA	7	193.13	1,352		
10 22 00	New Fire Curtain at Stage	SF	1,250	128.70	160,870	25' High	
10 28 00	Single Toilet Toilet Accessories	EA	102	326.26	33,279		
10 21 00	Shower Enclosures	EA	8	576.02	4,608		
10 10 00	Misc Specialties	SF	100,874	0.07	7,377		
	Total				225,476	\$2.24	

Item	Description	Unit	Quantity	Price	Amount	Cost/SF	Note
16	Equipment and Furnishings						
11 30 00	Ice Makers	EA	4	782.99	3,132		
11 30 00	Refrigerators; 25 CF	EA	4	1,874	7,497		
11 30 00	Microwave Ovens, Undercount	EA	4	403.13	1,613		
11 40 00	Concession Equipment	SF	5,000	76.75	383,726		
11 52 00	Projection Screens	EA	4	2,486	9,945		
11 61 00	Rigging and Stage Equipment	Allw	1	500,000	500,000		
12 30 00	Vanity Cabinets	LF	306	111.57	34,139		
12 30 00	Vanity Tops 2 cm Granite	LF	306	108.96	33,342		
12 60 00	Remove & Replace Theater Se	EA	2,600	231.80	602,681		
	Total				1,576,075	\$15.62	
17	Elevators						
14 20 00	New Elevators in Existing Shaft	EA	2	55,000	110,000		
	Total				110,000	\$1.09	
18	Fire Protection						
21 00 00	Relocate/Add Sprinkler Heads	SF	100,874	2.24	226,236		
21 00 00	Pre-Action System @ Compute	SF	2,017	3.11	6,278		
	Total				232,513	\$2.30	
19	Plumbing						
22 00 00	Plumbing Risers (DWV, HW, CV	LF	11,925	144.14	1,718,883		
22 00 00	Concession Plumbing	EA	4	3,140	12,561		Sink, Icemaker & DW Hookup
22 00 00	Plumbing	FX	204	2,490	508,014		
22 00 00	Concession Plumbing	SF	5,000	11.29	56,467		
22 00 00	Kitchen Equipment Hookup	LS	1	28,779	28,779		
	Total				2,324,705	\$23.05	

Item	Description	Unit	Quantity	Price	Amount	Cost/SF	Note
20	HVAC Systems						
23 00 00	Central Chiller Plant & Cooling	TN	700	1,094	765,924		
23 00 00	Air Handling Units	CFM	150,000	3.39	508,709	\$2.64 /CFM Equip	
23 00 00	FPVAV Boxes, Elec Heat	EA	28	780.00	21,691		
23 00 00	Interior VAV Boxes	EA	50	780.00	39,341		
23 00 00	Temperature Controls	SF	100,874	1.71	172,446		
23 00 00	Test and Balance	SF	100,874	0.14	14,028		
23 00 00	Kitchen Make Up Air & Exhaust	LS	1	38,373	38,373		
23 00 00	Liebert PBX/Computer Rm Unit	TN	15	2,094	31,404		
	Total				1,591,915	\$15.78	
21	Electrical						
26 00 00	480V Service Entrance & Switc	AMP	5,000	41.89	209,451		
26 00 00	Power Distribution	SF	100,874	1.59	160,495		
26 00 00	Hookup Liebert Units	TN	15	126.21	1,893		
26 00 00	Hookup Fan Powered Boxes	EA	28	495.52	13,780		
26 00 00	General Lighting Installation	EA	189	140.43	26,561	80 SF/EA	
26 00 00	Parabolic Light Fixtures	EA	189	144.00	27,236	\$120 /Fixture	
26 00 00	Lighting @ Unfinished Areas	SF	5,000	0.65	3,266	400 SF/EA	
26 00 00	Direct/Indirect Lighting	LF	5,044	75.64	381,514	85% Area	\$50.00/LF
26 00 00	Ballroom Area Lighting Premiur	SF	18,900	7.50	141,750		
26 00 00	Theater Sound & Lighting	Allw	1	350,000	350,000		
26 00 00	Refurbish Exterior Lighting	Allw	1	75,000	75,000		
26 00 00	Emergency and Exit Lighting	SF	100,874	0.23	23,201		
26 00 00	Tenant Switches	EA	95	124.66	11,789		
26 00 00	Motion Sensor Switches	EA	86	189.10	16,214		
26 00 00	Wall Outlets, MC Cable	EA	484	88.24	42,674	188 SF/EA	
26 00 00	Floor Outlets, Poke-Thru	EA	54	475.97	25,577	10%	
26 00 00	Workstations, 8 Wire Wall	EA	64	338.82	21,788	1086 SF/EA	6 Cubes
26 00 00	Workstations, 8 Wire Floor	EA	29	475.97	13,604	10%	
26 00 00	Dedicated Circuits	EA	6	399.25	2,396		
26 00 00	Telephone/Data Outlets	EA	1,680	63.10	105,987	54 SF/EA	
26 00 00	Telephone/Data Floor Outlets	EA	187	327.31	61,082	10%	
26 00 00	Relocate Existing Generator	Allw	1	75,000	75,000	0.00 Watts/SF	
28 00 00	Life Safety Systems	SF	100,874	0.90	90,787		
27 00 00	Paging/Music System	SF	100,874	0.00	0	With Phones ?	
26 00 00	Special Systems Conduit	SF	100,874	0.17	17,573		
26 00 00	Kitchen Equipment Hookup	LS	1	19,186	19,186		
27 00 00	Telephone System Allowance	LS	1	0.00	Exclude		
	Total				1,917,805	\$19.01	

**Existing Arena & Mercer Theater
Savannah, GA
February 12, 2016**

Concept Estimate Revised



**Existing Arena Renovations
84,224 SF**

<i>Item</i>	<i>Description</i>	<i>Cost</i>	<i>Cost/SF</i>
1	General Requirements	1,265,744	15.03
2	Demolition and Protection	295,615	3.51
3	Structure Modifications	975,489	11.58
4	Envelope	1,986,840	23.59
5	Rough Carpentry	19,193	0.23
6	Finish Carpentry and Millwork	218,040	2.59
7	Thermal and Moisture Protection	13,145	0.16
8	Doors, Frames and Hardware	97,951	1.16
9	Glass and Glazing	483,878	5.75
10	Drywall Systems	840,943	9.98
11	Stone and Tile	478,760	5.68
12	Acoustical Ceilings	310,935	3.69
13	Flooring	590,085	7.01
14	Painting and Wall Coverings	298,344	3.54
15	Specialties	440,293	5.23
16	Equipment and Furnishings	3,672,359	43.60
17	Elevators	0	0.00
18	Fire Protection	291,529	3.46
19	Plumbing	1,028,413	12.21
20	HVAC Systems	1,574,849	18.70
21	Electrical	1,581,240	18.77
	Subtotal	<u>16,463,646</u>	<u>195.47</u>
	Permits, Bonds and Insurance	920,026	10.92
	Contingency	869,184	10.32
	Escalation or Other	0	10.32
	Fee	638,850	7.59
	Total	<u>\$18,891,706</u>	<u>\$224.30</u>

Item	Description	Unit	Quantity	Price	Amount	Cost/SF	Note
2	Demolition and Protection <i>Remove The Following:</i>						
02 40 00	Interior Partitions and Finishes	SF	84,224	2.33	196,018		75% Total Gut
02 40 00	SOG, Neat for Plumbing	SF	4,211	6.81	28,662		Incl sawcut 5% Area
02 40 00	Temporary Partitions	SF	84,224	0.19	16,152		
02 40 00	Temporary Protection	LS	1	11,954	11,954		
02 40 00	Demolition Cleanup	SF	84,224	0.24	20,360		
02 40 00	Equipment & Dumpsters	%	10%		22,468		
	Total				295,615		\$3.51
3	Structure Modifications						
03 31 00	Patch or Replace SOG	SF	4,211	7.47	31,460		4" Thick 5% Area
05 50 00	Misc or Ornamental Metals	SF	84,224	1.86	156,785		0.25 #/SF
05 50 00	Structure Modifications	Allw	1	750,000	750,000		
04 20 00	6" CMU Partitions	SF	2,772	13.44	37,244		2% Wall LF 25% Grout
	Total				975,489		\$11.58
4	Envelope						
03 31 00	Patch & Point Exterior Skin	SF	47,940	18.00	862,920		
03 31 00	Remove & Replace Roofing	SF	64,224	17.50	1,123,920		
	Total				1,986,840		\$23.59
5	Rough Carpentry						
06 10 00	Misc Blocking, (1BF/LF Partitions)	BF	3,484	5.51	19,193		
	Total				19,193		\$0.23
6	Finish Carpentry and Millwork						
06 20 00	Plastic Laminate Base Cabinets	LF	120	129.57	15,548		
06 20 00	Plastic Laminate Counter Tops	LF	120	44.38	5,325		
06 20 00	Plastic Laminate Upper Cabinets	LF	120	119.25	14,310		
06 20 00	Reception Casework and Counters	LF	50	544.70	27,235		\$400 Mat'l
06 20 00	Stone Counter Tops	LF	50	164.38	8,219		\$125 Mat'l
06 20 00	Misc. Millwork	SF	80,024	1.12	89,279		
06 20 00	Executive Area Millwork	SF	4,200	9.86	41,423		
06 20 00	Layout and Cleanup	SF	84,224	0.20	16,701		
	Total				218,040		\$2.59
7	Thermal and Moisture Protection						
07 80 00	Misc Fire Stopping	SF	84,224	0.00			0 Included in MEP Trades
07 90 00	Misc Interior Caulking	SF	84,224	0.16	13,145		
	Total				13,145		\$0.16

Item	Description	Unit	Quantity	Price	Amount	Cost/SF	Note
8	Doors, Frames and Hardware						
08 10 00	Hollow Metal Door Frames	EA	73	120.00	8,760		
08 10 00	HM SL/BL Frames, ±16 SF/EA	EA	7	300.00	2,100	10% Doors	
08 10 00	Hollow Metal Doors	EA	8	305.00	2,440		
08 10 00	7' Plastic Laminate Doors	EA	73	190.00	13,870		Includes Factory Finish
08 10 00	Smoke and Sound Door Premit	EA	4	500.00	2,000		
08 10 00	Finish Hardware, Cylinder Lock	EA	66	450.00	29,565		
08 10 00	Hinges, Locks, & Stops Only	EA	7	170.00	1,241	10% Doors	
08 10 00	Unload & Distribute Dr, Frame,	EA	73	0.00	0		
08 20 00	Doors, Frames, Hardware Insta	LS	1	37,975	37,975		
	Total				97,951	\$1.16	
9	Glass and Glazing						
08 40 00	Replace Existing Glazing	SF	2,197	125.00	274,656		
08 40 00	Interior Storefront	SF	7,919	24.85	196,781	10% Wall LF	
08 40 00	Mirrors	SF	738	11.05	8,155		
08 40 00	Glaze Sidelites & Borrow Lites	SF	112	13.50	1,512		
08 40 00	Door Lites and Misc Glazing	EA	7	69.00	504	10% Doors	
08 40 00	Final Glass Cleaning	SF	21,946	0.10	2,270		
	Total				483,878	\$5.75	
10	Drywall Systems						
09 20 00	Partitions to Structure (One Ho	LF	3,088	179.59	554,609	78% Wall LF	
09 20 00	Partitions to Ceiling	LF	396	92.24	36,519	10% Wall LF	
09 20 00	Drywall Perimeter	SF	37,346	1.50	56,158		
09 20 00	Drywall at Columns	SF	12,727	3.17	40,380		
09 20 00	Suspended Drywall Ceilings/Sc	SF	12,634	4.50	56,809		15% Area
09 20 00	Drywall Bulkheads	LF	1,053	72.63	76,462		
09 20 00	Layout and Cleanup	SF	84,224	0.24	20,006		
	Total				840,943	\$9.98	
11	Stone and Tile						
09 30 00	12x12 Stone Tile Floors	SF	3,936	14.88	58,569	\$8.00 Mat'l	5% Area
09 30 00	Stone Tile Walls	SF	22,960	14.88	341,651	\$8.00 Mat'l	11% Wall
09 30 00	Quarry Tile Floors at Concessio	SF	5,000	6.90	34,507	\$2.50 Mat'l	6% Area
09 30 00	Quarry Tile Base	LF	619	9.11	5,639		6% Base
09 30 00	Wall Tile at Serving	SF	2,700	6.00	16,190	\$2.50 Mat'l	0% Wall
09 30 00	Misc Stone & Tile	SF	84,224	0.26	22,206		
	Total				478,760	\$5.68	
12	Acoustical Ceilings						
09 50 00	2x2 Acoustic Ceiling	SF	4,211	2.93	12,326		5% Area
09 50 00	2x2 Acoustic Ceiling (Washabl	SF	4,211	3.30	13,907		5% Area
09 50 00	2x2 9/16" Grid Tegular Acoustic	SF	4,200	3.94	16,531		5% Area
09 50 00	Sound Batts	SF	4,200	0.46	1,949		
09 50 00	Acoustic Wall Panels	SF	20,845	12.77	266,223	\$30/LY Mat'l	10% Wall
	Total				310,935	\$3.69	

Item	Description	Unit	Quantity	Price	Amount	Cost/SF	Note
13	Flooring						
09 90 00	Stain and Seal Concrete	SF	67,042	2.13	142,550		80% Area
09 60 00	LVT Flooring, 18" x 18"	SF	4,211	6.30	26,523	\$4.25 Mat'l	5% Area
09 60 00	Rubber Sports Flooring	SF	6,485	9.90	64,181	\$5.00 Mat'l	7% Area
09 60 00	Carpet Tiles	SY	491	31.08	15,268	\$22.00 Mat'l	5% Area
09 60 00	Floor Preparation	SF	75,465	1.62	122,166		90% Area
09 60 00	Floor Protection	SF	77,149	2.63	202,939		92% Area
09 60 00	4" Resilient Base	LF	9,804	1.68	16,459		94% Base
	Total				590,085	\$7.01	
14	Painting and Wall Coverings						
09 90 00	Paint Exposed Structure	SF	67,042	1.17	78,289		80% Area
09 90 00	Finish Doors & Frames	EA	80	46.39	3,711		
09 90 00	Paint Drywall Walls	SF	133,375	0.67	89,878		64% Wall
09 90 00	Polymix Wall Coatings	SF	52,112	1.60	83,581	\$1.00 Mat'l	25% Wall
09 90 00	Painted Ceilings	SF	13,686	0.88	11,987		
09 90 00	Final Cleanup and Punchlist	SF	84,224	0.20	16,698		
09 90 00	Misc. Items	LS	1	14,200	14,200		5%
	Total				298,344	\$3.54	
15	Specialties						
10 10 00	Audio/Visual Units	EA	4	1,373	5,490		
11 52 00	Projection Screens	EA	4	2,486	9,945		
10 10 00	Door Signage	EA	73	29.38	2,145		
10 51 00	Athletic Lockers	EA	500	284.30	142,150		
10 40 00	Fire Extinguishers and Cabinet	EA	9	193.13	1,738		
10 22 00	Gym Curtain	SF	1,875	128.70	241,304	25' High	
10 28 00	Single Toilet Toilet Accessories	EA	82	326.26	26,753		
10 21 00	Shower Enclosures	EA	8	576.02	4,608		
10 10 00	Misc Specialties	SF	84,224	0.07	6,159		
	Total				440,293	\$5.23	
16	Equipment and Furnishings						
11 30 00	Ice Makers	EA	4	782.99	3,132		
11 30 00	Refrigerators; 25 CF	EA	4	1,874	7,497		
11 30 00	Microwave Ovens, Undercount	EA	4	403.13	1,613		
11 40 00	Concession Equipment	SF	5,000	76.75	383,726		
11 52 00	Scoreboard	LS	1	1,000,000	1,000,000		
11 80 00	Trash Compactor	LS	1	7,500	7,500		
11 61 00	Athletic Equipment	LS	1	500,000	500,000		
12 30 00	Vanity Cabinets	LF	246	111.57	27,445		
12 30 00	Vanity Tops 2 cm Granite	LF	246	108.96	26,805		
12 60 00	Remove & Replace Arena Seat	EA	8,507	201.57	1,714,642		
	Total				3,672,359	\$43.60	
17	Elevators						
	Total				0	\$0.00	

Item	Description	Unit	Quantity	Price	Amount	Cost/SF	Note
18	Fire Protection						
21 00 00	Relocate/Add Sprinkler Heads	SF	84,224	3.46	291,529		
	Total				291,529	\$3.46	
19	Plumbing						
22 00 00	Plumbing Risers (DWV, HW, CV)	LF	3,710	144.14	534,764		
22 00 00	Plumbing	FX	164	2,490	408,403		
22 00 00	Concession Plumbing	SF	5,000	11.29	56,467		
22 00 00	Kitchen Equipment Hookup	LS	1	28,779	28,779		
	Total				1,028,413	\$12.21	
20	HVAC Systems						
23 00 00	Central Chiller Plant & Cooling	TN	700	1,094	765,924		
23 00 00	Air Handling Units	CFM	168,448	3.39	571,273	\$2.64 /CFM Equip	
23 00 00	FPVAV Boxes, Elec Heat	EA	21	780.00	16,183		
23 00 00	Interior VAV Boxes	EA	42	780.00	32,847		
23 00 00	Temperature Controls	SF	84,224	1.64	138,536		
23 00 00	Test and Balance	SF	84,224	0.14	11,713		
23 00 00	Kitchen Make Up Air & Exhaust	LS	1	38,373	38,373		
	Total				1,574,849	\$18.70	
21	Electrical						
26 00 00	480V Service Entrance & Switc	AMP	5,000	41.89	209,451		
26 00 00	Power Distribution	SF	84,224	1.59	134,004		
26 00 00	Hookup Fan Powered Boxes	EA	21	495.52	10,281		
26 00 00	General Lighting Installation	EA	158	140.43	22,177	80 SF/EA	
26 00 00	Parabolic Light Fixtures	EA	158	144.00	22,740	\$120 /Fixture	
26 00 00	Lighting @ Unfinished Areas	SF	5,000	0.65	3,266	400 SF/EA	
26 00 00	Direct/Indirect Lighting	LF	4,211	75.64	318,543	85% Area	\$50.00/LF
26 00 00	Sports Lighting Premium	SF	64,224	7.50	481,680		
26 00 00	Emergency and Exit Lighting	SF	84,224	0.23	19,372		
26 00 00	Tenant Switches	EA	79	124.66	9,843		
26 00 00	Motion Sensor Switches	EA	72	189.10	13,538		
26 00 00	Wall Outlets, MC Cable	EA	397	88.24	35,042	191 SF/EA	
26 00 00	Floor Outlets, Poke-Thru	EA	44	475.97	21,002	10%	
26 00 00	Workstations, 8 Wire Wall	EA	54	338.82	18,192	1086 SF/EA	6 Cubes
26 00 00	Workstations, 8 Wire Floor	EA	24	475.97	11,358	10%	
26 00 00	Dedicated Circuits	EA	4	399.25	1,597		
26 00 00	Telephone/Data Outlets	EA	1,402	63.10	88,493	54 SF/EA	
26 00 00	Telephone/Data Floor Outlets	EA	156	327.31	51,000	10%	
28 00 00	Life Safety Systems	SF	84,224	0.90	75,802		
27 00 00	Paging/Music System	SF	84,224	0.00	0	0 With Phones ?	
26 00 00	Special Systems Conduit	SF	84,224	0.17	14,673		
26 00 00	Kitchen Equipment Hookup	LS	1	19,186	19,186		
27 00 00	Telephone System Allowance	LS	1	0.00	Exclude		
	Total				1,581,240	\$18.77	

APPENDIX D: WATER RESOURCE ANALYSIS

THOMAS & HUTTON

50 PARK OF COMMERCE WAY | SAVANNAH, GA 31405
912.234.5300 | WWW.THOMASANDHUTTON.COM

MEMORANDUM

TO: Mr. James J. Collins, P.E.
FROM: Kevin Smith, P.E.
DATE: February 16, 2016
SUBJECT: City of Savannah Arena Project – Water Resources
JOB NO.: 25811.0000

In accordance with Section 2.6.7 of the scope of services as stated in the request for proposal, this memorandum serves as a portion of the water resource analysis scope for the City of Savannah Civic Center/Arena Site Study. Discussions regarding applicability and locations of green infrastructure practices are included in a separate memorandum. The contents of this memorandum strive to provide conceptual guidance for site development while including compliance with existing studies, current flood minimization policy and City of Savannah regulations.

CITY OF SAVANNAH STORMWATER REGULATIONS

The City of Savannah strives to balance proposed development with environmentally sensitive stormwater policy. The City of Savannah aims to decrease stormwater runoff from proposed developments, provide water quality treatment prior to runoff discharges into our streams and river, control peak runoff flows to mimic pre-development conditions and maintain overbank floodplain storage. Typical City of Savannah stormwater regulations for proposed developments include:

- Post development runoff rates shall not exceed pre-developed runoff rates for the 1-year, 5-year, 10-year, and 25-year, 24-hour design storms.
- Sites must meet the City stormwater runoff reduction regulations. A site is presumed to comply with this requirement if the runoff volume from 1.2 inches of rainfall over the site is treated by a series of green infrastructure practices, though infiltration, evapotranspiration, and/or reuse. Due to potable water cross-contamination concerns, irrigation re-use has not been allowed within the City. Green infrastructure practice descriptions can be found in the Georgia Stormwater Management Manual Coastal Stormwater Supplement (CSS). Historically, there has been some leniency in regards to the stormwater runoff reduction volume to be treated if sites have restraints and hardships such as contaminated soils, very poor draining soils or very high groundwater tables. Consideration and approval for a reduction in stormwater reduction volume is granted by the stormwater administrator upon submittal of appropriate documentation of unfavorable site conditions. Any portion of the 1.2-inch stormwater runoff reduction volume that is not treated by green infrastructure practices must be treated for water quality. Green infrastructure is discussed in a separate memorandum.
- Storm water quality is presumed to be achieved if the site treats the entire 1.2-inch stormwater reduction volume by the employment of green infrastructure practices. For sites that require stormwater water quality treatment, wet ponds, dry ponds, swales,

- and other best management practices may be employed to comply with the stormwater water quality regulations.
- Redevelopment may be presumed to comply with stormwater runoff reduction and stormwater quality regulations by meeting one of the following criteria:
 - Reduce existing site impervious coverage by 10%; or
 - Provide post- developed stormwater management; or
 - Provide off-site stormwater management; or
 - Provide off-site stormwater management within City right-of-way or city-owned property where green infrastructure and low impact development practices are in place at completion of redevelopment; or
 - A combination of the above.
 - Typically, extended detention of the 1-year, 24-hour storm event is required to protect local aquatic resources from negative impacts of post-developed stormwater runoff. Due to the location of the Arena/Civic Center site, compliance with this provision is not required.
 - Post-developed stormwater runoff discharge rates generated by the overbank storm event (as defined in the CSS) must be controlled such that flows do not exceed pre-developed conditions. Development sites are presumed to comply with this provision if post-developed flow rates do not exceed pre-developed flow rates for the 1-year, 5-year, 10-year, and 25-year, 24-hour design storm event.
 - All site development is required to safely pass or detain stormwater runoff generated from the 100-year, 24-hour design storm event, such that there are no increases in in duration, frequency and magnitude of downstream flooding.
 - Development cannot increase predicted peak water surface elevations above the effective base flood elevation the FEMA Special Flood Hazard Area (SFHA) for the 1% probability storm event, or in areas where local hydrologic modeling has predicted flooding with occur for the 100-year, 24-hour event.
 - Floodplain mitigation can be achieved by providing compensatory mitigation for all floodplain volume displaced by proposed development fill or redevelopment activities below the base flood elevation.

PREVIOUS STUDIES APPLICABLE TO THE SITE

There have been many studies completed that assess the Springfield Canal Drainage Basin, associated drainage conveyances and conveyance level of services.

- "Floodplain Information, Springfield Canal", by the U.S. Army Corps of Engineers, dated 1978
- "Study of the Springfield Canal and its Tributaries in relation to 2 to 50 Year Frequency Storm", by Thomas & Hutton Engineering Co. dated 1978.
- "Springfield Canal Flood Damage Reduction Study Savannah, Georgia", by the U.S. Army Corps of Engineers, dated 1989.
- "The Springfield Canal in the Vicinity of Feiler Terrace", by the Hussey Gay Bell and DeYoung, dated 1990.
- "Springfield Canal Drainage Study", by Thomas & Hutton Engineering Co. dated 1993; revised 1996.
- "Stormwater Management Report for Springfield Canal Improvements", by Thomas & Hutton Engineering Co., dated 2009.
- "Drainage Study Update for Springfield Canal", by Thomas & Hutton Engineering Co., dated 2011.

The City of Savannah implemented many of the recommendations set forth in the "Springfield Canal Study" (dated 1996) in the late 1990s and early 2000s. Springfield Canal basin improvements constructed to date include a 1,050 cubic feet per second stormwater pumping station north of Oglethorpe Avenue, the removal and replacements of bridge crossings (and installation of sheet piling between the bridges) at the Savannah College of Arts and Design dormitories, the construction of detention basins at Williams Ward Subdivision and Clinch Street, and culvert upgrades at Bowles Ford, Feiler Terrace, Stiles Terrace, and Demeres Ward. Lastly, the Springfield Canal Improvements widened the canal (15 to 25-foot bottom width) to provide a conveyance level of service capable of accommodating projected stormwater runoff flows from a 2-year, 24-hour design storm event. The stormwater pumping station was designed to accommodate projected flows from a 25-year, 24-hour design storm.

Recommendations set forth in the 2009 "Stormwater Management Report for Springfield Canal Improvements" study by Thomas & Hutton (2009 Study) include proposed improvements that are anticipated to increase the Springfield Canal conveyance level of service to projected 100-year, 24-hour design flows. Specifically, implementation of a portion of Phase 1 improvements as noted in the 2009 Study can provide significant water resource related benefits to the Civic Center/Arena site. These improvements include:

1. Expansion of existing pump station north of Oglethorpe to approximately 3,150 cubic feet per second (from 1,050 cubic feet per second). This would include adding approximately 13 new pumps, each having a capacity of approximately 75,000 gallons per minute.
2. Widening of the canal channel to 100-foot bottom width from existing pump station, approximately one mile upstream, to Gwinnet Street.
3. Installation of 100-foot bridge at Louisville Road.
4. Installation of Fabriform along sideslopes for the length of canal.

The construction of these improvements prior to, or concurrent with, the Civic Center/Arena project may eliminate the requirements for peak flow attenuation and flood mitigation for the site, subject to final City approval. Conformance to stormwater runoff reduction and water quality standards would still remain applicable to the site. Utilizing cost figures noted in the 2009 Study, the proposed portions of Phase 1 improvements benefiting the Civic Center/Arena site, from Gwinnet Street downstream, would cost approximately \$25M. It is anticipated this number would increase to approximately \$33M, based on current costs. This cost does not include presently unknown environmental remediation costs.

WEST BOUNDARY CANAL DISTRICT

The City of Savannah commissioned a Civic Vision Plan (Civic Plan) for the West Boundary Canal District (Canal District) in 2013. The Civic Plan (Figure 1) proposes to transform canal routes into an urbanized trail network connecting the existing City of Savannah Center to the proposed Canal District and surrounding neighborhoods. Based on the initiatives of the Civic Plan and 2009 Study recommendations, it appears that infrastructure improvements required in each would be complimentary to each other and ultimately provide mutual benefit. The required canal widening and overbank maintenance strips can create the vision of the Civic Plan by providing the pedestrian trail. For purposes of this analysis, greenways are separate, and in addition to, the recommended right of way for the widened canal.

FIGURE 1 – CIVIC PLAN

(Extracted from the West Boundary Canal District, Civic Vision Plan from Council Work Session Presentation, dated October 17, 2013)



CONCEPT PLAN

Based on a conceptual land plan provided by the project Architect, Thomas & Hutton has provided a conceptual grading plan (Figure 2) for the proposed Civic Center/Arena development. The conceptual grading plan aims to conform to City stormwater regulations through the use of on-site infrastructure, to the extent practical. It should be noted that due to environmental contaminant concerns yielded in the conceptual environmental analysis, the implementation of the 2009 Study recommendations may require extensive environmental remediation on adjacent sites to accommodate the 100-foot proposed width of the Springfield Canal. The proposed widened canal may act a conduit for the transport of environmental contaminants from adjacent sites. Further investigation is required to determine if remediation measures are required and the magnitude of remediation costs that would be required. For this reason, the concept plan was completed assuming the peak flow attenuation and water quality treatment would be provided offsite and that the Springfield Canal was not widened as recommended in the 2009 Study. The site grading cuts and fill quantities were balanced within the floodplain to negate impacts to floodplain volumes from site development. These items are discussed in greater detail below.

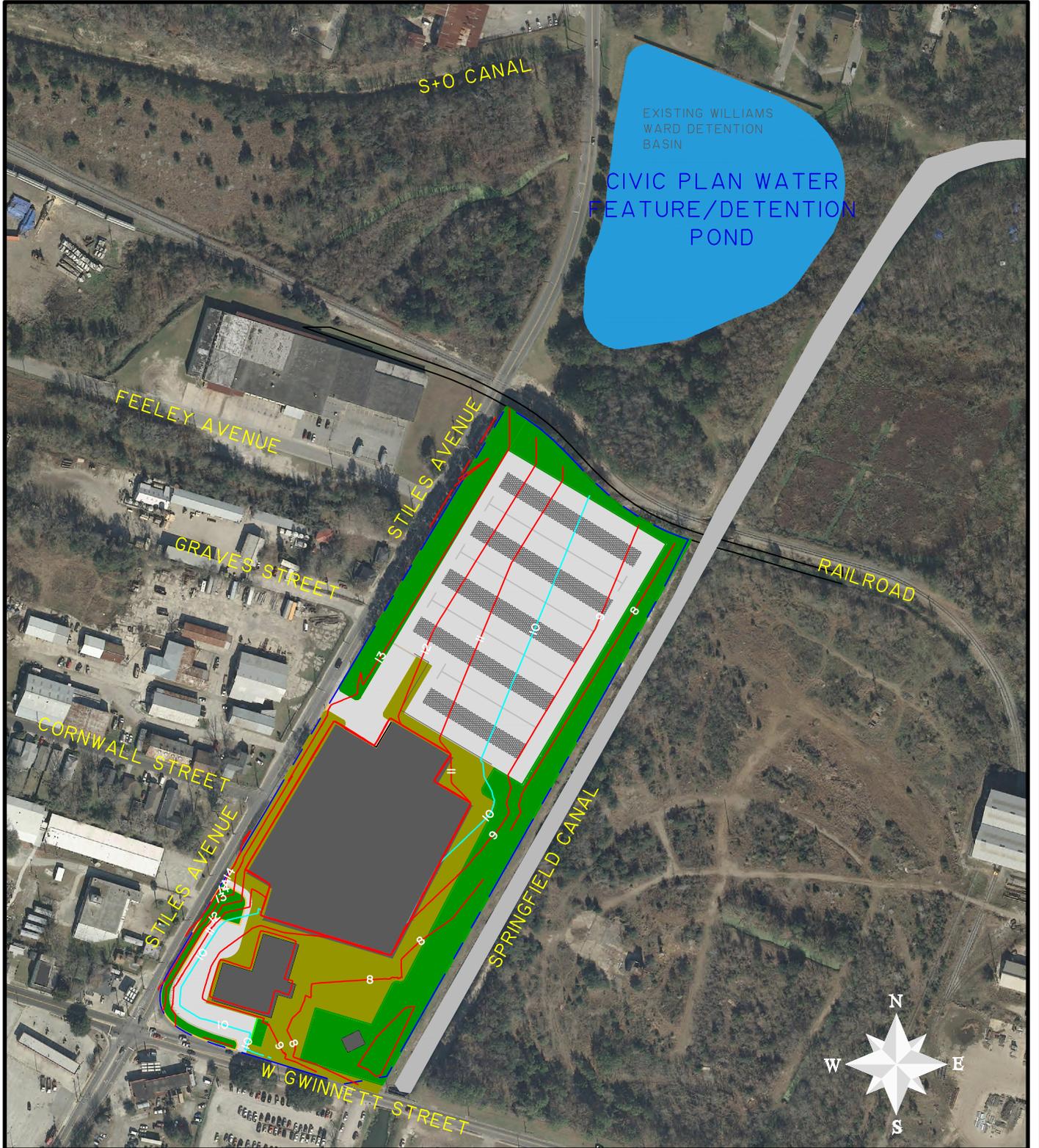
SITE STORMWATER – PEAK FLOW CONTROL AND WATER QUALITY TREATMENT

Due to the size of the Civic Center/Arena structure and associated ancillary facilities, it is not feasible to provide complete stormwater detention for flood control and sizeable water quality treatment on the proposed Civic Center/Arena Site. The Civic Plan proposes a water feature on City-owned property southeast of the Stiles Avenue and Louisville Road intersection, in the area of the existing Williams Ward Detention basin. Constructed in 2001, the Williams Ward Detention Basin was one of many Springfield Canal drainage basin improvement projects installed to minimize flooding on adjacent parcels/structures. The Civic Plan envisions modifications to the existing William Ward detention basin, providing a water feature that would complement the proposed Canal Park and enhance the multi-modal vision. This area should be further evaluated and assessed using a holistic approach to determine how regional detention/water quality treatment can be employed to serve all aspects of the proposed Civic Center/Arena project and the impervious components of the Civic Plan. It should be noted that the Civic Center/Arena site development may still be required to conform to City of Savannah Stormwater Runoff Reduction requirements. Onsite green infrastructure/low impact development practices used to meet stormwater runoff reduction standards can also serve as flood control reduction and water quality treatment. A greater level of detailed analysis will be required to determine the benefits of onsite green infrastructure practices and the magnitude of flood control and water quality reduction benefits.

It should be noted that if the Civic Center/Arena site is constructed concurrently with Springfield Canal Phase 1 improvements, peak flow attenuation may not be required since 100-year, 24-hour conveyance level of service will be provided to the Savannah River. Water quality treatment and stormwater runoff reduction standards would still remain applicable to the site development. Water quality treatment can occur using several methods, such as a smaller treatment pond, through the use of green infrastructure or by proprietary best management practices.

FLOODPLAIN MITIGATION

Portions of the proposed Civic Center/Arena site are located in a Federal Emergency Management Agency (FEMA) Special Flood Hazard Areas (SFHA) Zone A, having a base flood elevation (BFE) of 11 (Figure 3). It should be noted that this discussion is based on effective FEMA Flood Insurance Rate Maps (FIRMs) that are used for purposes of rendering regulating decisions. Furthermore, FEMA and the Georgia Department of Natural Resources are currently administering a FEMA coastal zone analysis



CIVIC CENTER/ARENA SITE STUDY

CONCEPT PLAN - FIGURE 2

CLIENT:
CITY OF SAVANNAH

LOCATION: SAVANNAH, GEORGIA

DATE: 2/18/16

JOB NUMBER: J-25811.0000

DRAWN BY: KMS

REVIEWED BY: KMS

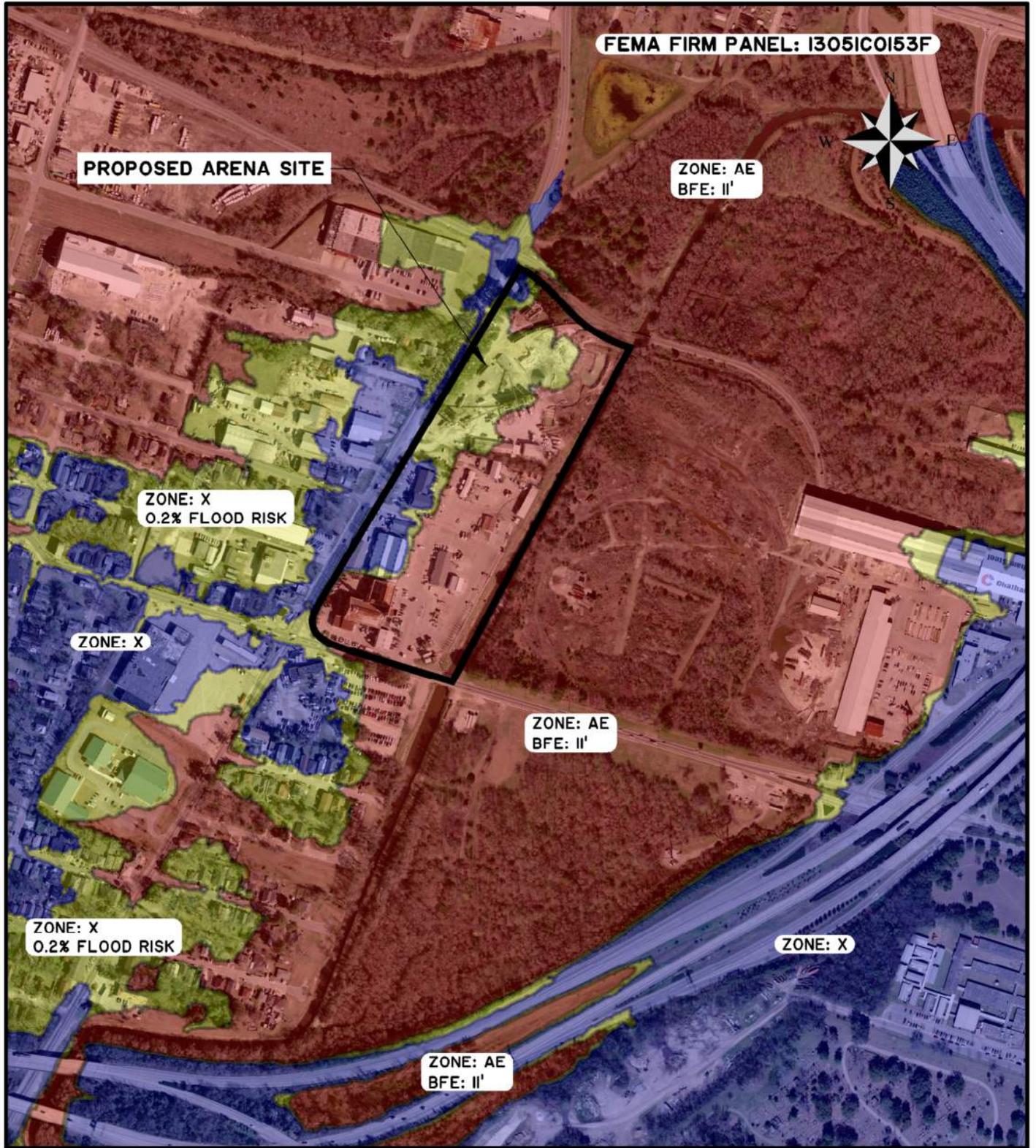
SHEET: FIGURE 2

SCALE: 1" = 300'

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Savannah, GA 31405 • 912.234.5300

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City of Savannah

FEMA Base Elevations
Effective FEMA Floodplain - Figure 3

CLIENT:
City of Savannah

LOCATION: Chatham County, Georgia	DRAWN BY: AWS	SHEET: Exhibit
DATE: 2/11/16	REVIEWED BY: KMS	SCALE: 1" = 500'
JOB NUMBER: J-25811		

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and map update initiative. Based on preliminary coastal zone analysis data, the ongoing update may result in a lower FEMA SFHA BFEs. Revised preliminary maps have not been published to date for areas within the City of Savannah. The revised coastal maps cannot be used for regulating decisions until they become effective, which is generally a year after preliminary maps are available to the public.

There are several options available to use to achieve floodplain mitigation in accordance with the City regulations for the Civic Center/Arena site. These are discussed in great detail below.

Balance Cut/Fill with Onsite Grading

The cut and fill quantities within the floodplain on the Concept Plan are balanced such that floodplain mitigation should not be required. The concept plan presently assumes surface parking on grade. Should a parking structure be required as the arena land plan evolves, the need for compensatory floodplain mitigation required for the development can increase. There are several options that may be evaluated for meeting additional floodplain mitigation requirements noted below.

2009 Study – Complete portions of Recommended Phase 1 Improvements

As indicated in the 2009 Study, by providing a 100-year stormwater flow conveyance level of service downstream to the Savannah River, floodplain mitigation and detention requirements may be waived, subject to City approval. The City has verbally agreed to this waiver on prior projects. To provide 100-year flow conveyance level of service would require the following improvements, as recommended in the 2009 Study:

1. Expansion of existing pump station north of Oglethorpe to approximately 3,150 cubic feet per second (from 1,050 cubic feet per second). This would include adding approximately 13 new pumps, each having a capacity of approximately 75,000 gallons per minute.
2. Widening of the canal channel to 100-foot bottom width from existing pump station, approximately one mile upstream, to Gwinnet Street.
3. Installation of 100-foot bridge at Louisville Road.
4. Installation of Fabriform along sideslopes for the length of canal.

It is anticipated the cost of improvements bases on 2009 Study recommendations will be \$33M. Further investigation is required to determine the improvements required, potential contaminant issues and overall feasibility of this option.

Floodplain Mitigation – Onsite (2009 Study)

Using a phased approach of the recommendations of the 2009 Study, the Springfield Canal can be widened to the appropriate width on City property. The canal may be excavated to a 50 feet west of the existing canal centerline on the Civic Center/Arena site. This would essentially construct half of the recommended 100-foot canal width along the property border. This option would provide for a maintenance strip to be set an elevation one-foot (minimum) above normal canal elevations. The volume of excavation can be determined by calculated by summing volume differences between:

1. Existing grade and the proposed maintenance elevation
2. Existing ground and the canal normal water elevation, for portions of the canal to be widened longitudinally along the canal alignment.

Further analysis and detailed design would be required to determine the feasibility of this option.

Regional Detention Basin and Compensatory Floodplain Mitigation

The Civic Plan envisions a water feature adjacent to the proposed Canal Park. The water feature can serve multiple purposes, including an aesthetic water feature, regional stormwater detention, and stormwater water quality treatment for proposed development stormwater runoff. A regional detention basin can serve as flood control, flow attenuation, water quality treatment, and floodplain mitigation for all proposed Civic Center/Arena and Civic Plan development activities. Further analysis and engineering is required for this option.

As the environmental section indicates, there are still many unknowns regarding the extent of groundwater contamination and groundwater elevations. As additional information becomes available regarding these items, the stormwater approaches and strategies noted above can be refined, expanded, or eliminated bases on the findings. As the project progresses and more detailed information becomes available, further analysis is recommended to determine the feasibility of the stormwater management strategies and approaches discussed in this section.

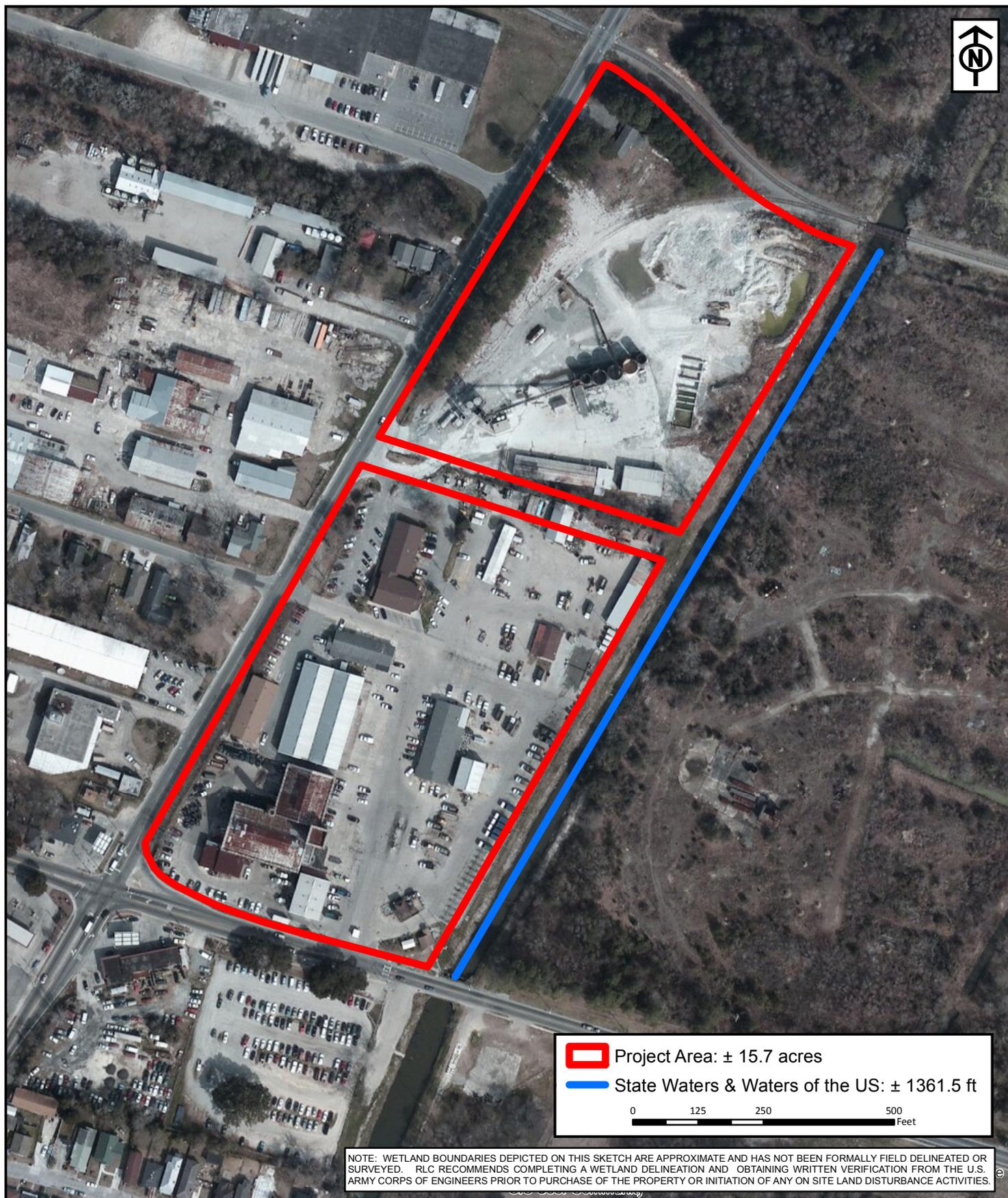
APPENDIX E: WETLANDS

APPENDIX E: WETLANDS

Resource & Land Consultants (RLC) Opinion

Based on our preliminary assessment and as a result of past land uses (excavation/fill), it is our opinion that the project area does not contain jurisdictional waters of the U.S. or State Waters. As depicted on the attached exhibit, Springfield Canal (adjacent to the project area) would be considered a jurisdictional waters of the U.S. and State Waters. Impacts to the canal associated with the site development (i.e. stormwater outfalls and/or improvements), may require authorization from the USACE and EPD.

It is RLC's opinion that the City-owned properties to the north and east outside of the arena site do contain freshwater wetlands.



 Project Area: ± 15.7 acres

 State Waters & Waters of the US: ± 1361.5 ft

0 125 250 500
Feet

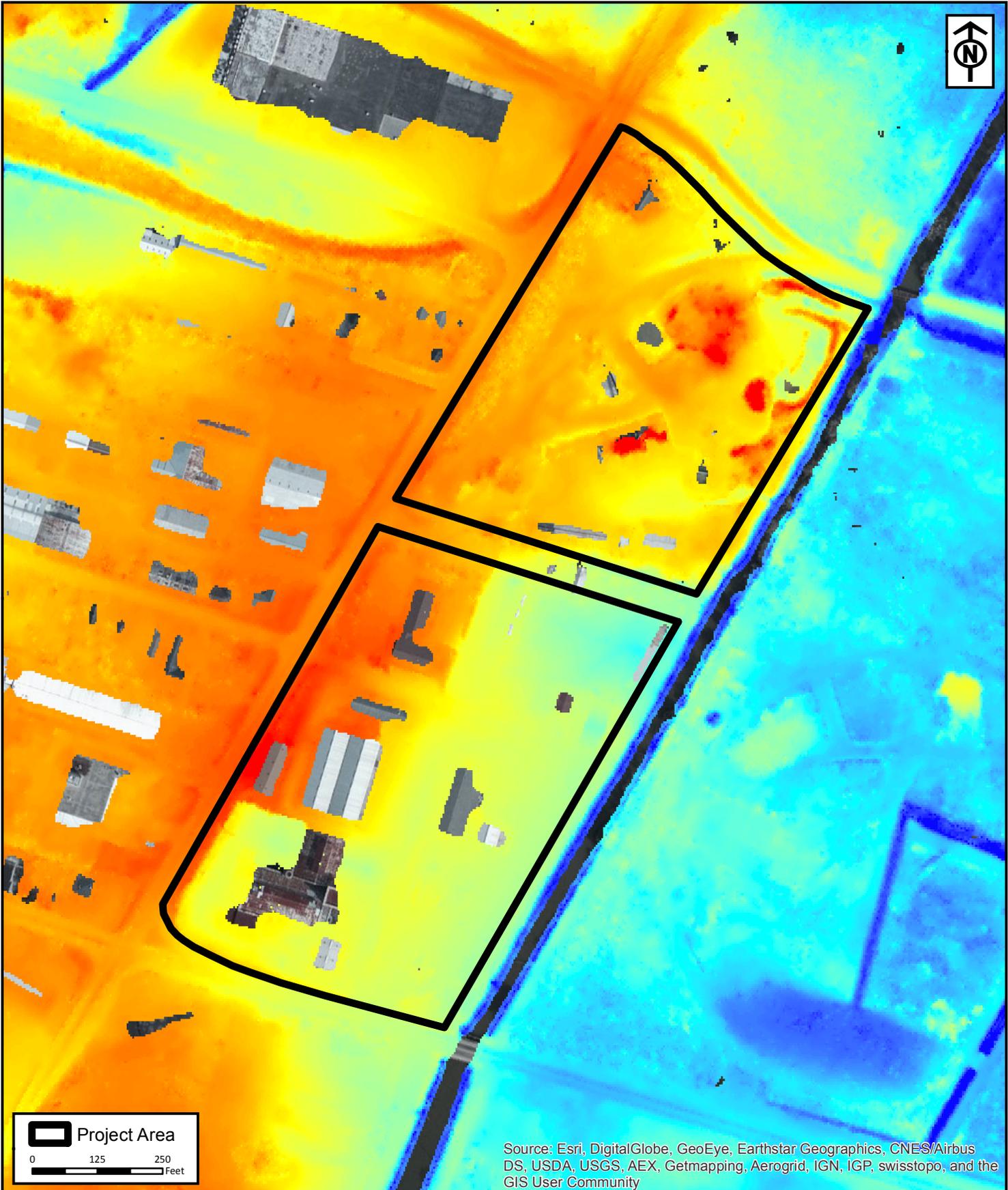
NOTE: WETLAND BOUNDARIES DEPICTED ON THIS SKETCH ARE APPROXIMATE AND HAS NOT BEEN FORMALLY FIELD DELINEATED OR SURVEYED. RLC RECOMMENDS COMPLETING A WETLAND DELINEATION AND OBTAINING WRITTEN VERIFICATION FROM THE U.S. ARMY CORPS OF ENGINEERS PRIOR TO PURCHASE OF THE PROPERTY OR INITIATION OF ANY ON SITE LAND DISTURBANCE ACTIVITIES.

RLC Project No.:	15-266
Figure No.:	1
Sketch Date:	17 December 2015
Prepared By:	ZM
Map Scale :	1 inch = 250 feet

City Arena Project
Chatham County, Georgia

Approximate Wetland Sketch
Prepared For: City of Savannah

RLC
RESOURCE+LAND CONSULTANTS
41 Park of Commerce Way, Ste. 303
Savannah, Georgia 31405
912.443.5896 www.rlandc.com



Project Area

0 125 250
Feet

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

RLC Project No.:	15-266
Figure No.:	2
Sketch Date:	17 December 2015
Prepared By:	ZM
Map Scale :	1 inch = 250 feet

City Arena Project
Chatham County, Georgia

NOAA Topographic Lidar
Prepared For: City of Savannah

RLC
**RESOURCE+LAND
CONSULTANTS**
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Savannah, Georgia 31405
912.443.5896 www.rlandc.com

APPENDIX F:
ENVIRONMENTAL
REVIEW REPORT

Environmental Review of the City of Savannah Arena Site

City of Savannah
Stiles Avenue and West Gwinnett Street
Savannah, Chatham County, Georgia

March 15, 2016
Terracon Project No. ES157133



Prepared for:

City of Savannah
Savannah, Georgia

Prepared by:

Terracon Consultants, Inc.
Savannah, Georgia

terracon.com

Terracon

Environmental



Facilities



Geotechnical



Materials



March 15, 2016

Thomas and Hutton
50 Park of Commerce Way
Savannah, Georgia 31405

Attn: Mr. Jim Collins, P.E.
P: (912) 721 4134
E: collins.j@thomasandhutton.com

**Re: Environmental Review
Proposed Arena Area**
Stiles Avenue and West Gwinnett Street
Savannah, Chatham County, Georgia
Terracon Project No: ES157133

Dear Mr. Collins:

Terracon Consultants, Inc. (Terracon) is pleased to submit the enclosed environmental review report for the above-referenced site. This assessment was performed in accordance with the Sub-Consultant Agreement for Services between Terracon and Thomas & Hutton Engineering Co. (Thomas & Hutton), dated December 14, 2015.

We appreciate the opportunity to be of service to you on this project. In addition to environmental review services, our firm provide **geotechnical, environmental, construction materials, and facilities services** on a wide variety of projects nationwide. For more detailed information on all of Terracon's services, please visit our website at www.terracon.com.

If you have any questions regarding this report or if we may be of further assistance, please do not hesitate to contact us at your earliest convenience.

Sincerely,
Terracon Consultants, Inc.

Justin J. Johnson, P.G.
Senior Project Geologist

William S. Anderson, III, P.E.
Senior Principal, Office Manager



Terracon Consultants, Inc. 2201 Rowland Avenue Savannah, Georgia 31404
P (912) 629 4000 F (912) 629 4001 terracon.com

Environmental



Facilities



Geotechnical



Materials

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APPENDIX C Site Photographs
APPENDIX D Regulatory File Review Documents

EXECUTIVE SUMMARY

Terracon has conducted an environmental review of the target tracts and surrounding properties for the City of Savannah Arena Site located to the north of West Gwinnett Street, between Stiles Avenue and the Springfield Canal (New Arena Site). The environmental review included a review of previous environmental assessment reports, historical use documents, environmental regulatory database information, and a site reconnaissance. The purpose of the review was to identify potential environment concerns for the target tracts and surrounding properties in order to address the following questions:

- Have the target tracts been adequately investigated?
- Exactly which parcels / geographic areas abutting the target tracts are contaminated?
- What are the contaminants of concern (COCs)?
- What are the current conditions / geographic extents of the existing plumes?
- Does the source material remain at these sites?

Environmental background information for the target tracts and surrounding properties was then used to answer the following environmental “engineering” questions:

- Does the Canal *truly* act as a groundwater divide and prevent / retard migration of contaminants to the east onto the target tracts? If not, have the outer eastern boundaries of the target tracts been adequately assessed?
- Is the surface water within the Canal currently contaminated by the migration of contaminants through the surficial aquifer?
- What is groundwater quality of the Canal today? What do we predict it will be 5 years from now? In 10 years?
- Will the permeable backfill of proposed utility lines (particularly stormwater piping / culverts) serve as preferential pathways for the migration of groundwater contamination?
- Is depth to the saturated zone (“water table”) consistent across the sites? Are the depths a problem for construction?
- If so, will dewatering activities be necessary for construction? Will dewatering draw in or “speed up” the movement of contaminated groundwater into areas known to be “clean” or at least “less impacted”?
- Exactly what measures (and costs) will be required to handle the disposal of groundwater withdrawn from the surficial aquifer during dewatering operations?
- Will long-term dewatering / disposal be necessary?
- Will long-term groundwater monitoring and / or remediation be necessary?

- Will contaminant barrier walls be necessary?
- Could pervious surface improvements be unwise in some locations with regard to recharge of the surficial aquifer / contaminant transport?

A brief summary of our findings is provided below, followed by conclusions and recommendations. It should be recognized that details are not included or fully developed in this section, and **the report must be read in its entirety** for a comprehensive understanding of the items contained herein.

Findings

Target Tracts

The target tracts for the New Arena Site include the City of Savannah Vehicle Maintenance Center (City Lot) and the former LaFarge Concrete Plant (LaFarge Site). The following on-site areas of concern (AOCs) were noted for the target tracts based on the review of previous environmental assessment reports, historical use documents, environmental regulatory database information, and site reconnaissance:

- **Fueling Station and USTs** – An active fueling station with four (4) underground storage tanks (USTs) is currently on the City Lot. In addition, regulatory database information indicates that two (2) UST releases have been reported at the City Lot. Both LUSTs have been issued “No Further Action” (NFA) letters by the Georgia Environmental Protection Division (EPD). However, there is the potential for petroleum impacted soil and groundwater to be encountered during the excavation and removal of the active fueling station and USTs.
- **Monitoring Wells** – Two (2) monitoring wells were observed on the southwest corner of the City Lot and downgradient from two off-site leaking UST (LUST) sites. These wells (MW-20 and MW-21) appear to be part of the monitoring well network for the Jackson Brothers Service Center (El Cheapo Gas Station). A site map of the Jackson Brothers Site also shows a third well (MW-19) in the southwest corner of the City Lot. Historical analytical results indicate that benzene has been detected in wells MW-19 and MW-21 at concentrations exceeding the Type 1 risk reduction standard (RRS) for benzene.
- **Suspected UST(s)** – Two circular vaults with uncapped metal pipes cut flush to grade were observed in the concrete pavement adjacent to the northwest corner of the vehicle maintenance shop. In addition, two galvanized metal pipes were observed protruding from the concrete adjacent to a brick wall approximately 10 feet from the circular vaults. These features resemble fill ports and vent pipes, suggesting the presence of one or more USTs at this location.
- **Vehicle Maintenance Shop** – Historical documents suggest that the City has been using the City Lot for the maintenance and repair of vehicles and equipment since at least the

1960s. Used petroleum products, solvents, and other chemicals associated with maintenance and repair activities may have impacted surface soil, subsurface soil, and groundwater at the City Lot.

- **Buried Medical Wastes** – The current Water & Sewer Planning & Engineering Building was previously operated by the American Red Cross as the Savannah Regional Blood Center. Terracon was previously informed by site personnel that buried medical wastes were encountered during an excavation near the building a number of years ago. There is the potential for biologically hazardous waste to be encountered during future excavations of this area.
- **Former Paint Shop** – Terracon was previously informed by site personnel that the current Refuse Department building was formerly used as a paint shop for traffic signs and signals. Used paint and solvents associated with the paint shop may have impacted surface soil, subsurface soil, and groundwater at the City Lot.
- **Former Coal Pocket** – Historical use information suggests the presence of a coal storage yard adjacent to the west side of the former Boiler House (now part of the Vehicle Maintenance Shop). Stormwater runoff and leachate from the coal pile may have impacted surrounding soil and groundwater with heavy metals and petroleum hydrocarbons.
- **Former Fueling Station** – Historical use information suggests the presence of an aboveground fuel tank with an earthen berm and pump station in the west central portion of the City Lot (near the current location of the Water Distribution Department building). Historical spills associated with this fueling station may have impacted underlying soil and groundwater with petroleum hydrocarbons and lead.
- **Asbestos Containing Materials (ACMs)** – Historical records indicate that a majority of the buildings on the City Lot were constructed between 1892 and 1968. Therefore, a number of these buildings are likely to have ACMs.

Surrounding Properties

The following environmental concerns were noted for properties in the vicinity of the New Arena Site and Canal District:

- **Tenenbaum Property** –The Tenenbaum property is on the opposite (east) side of the Springfield Canal from the New Arena Site. Historical documents suggest that industrial operations were conducted on the property from sometime prior to 1916 until at least 1994. Historical industrial operations may have impacted soil and groundwater at the Tenenbaum property. The local topography suggests that the western portion of the Tenenbaum property is upgradient from the Springfield Canal and New Arena Site.

- **Stiles Avenue Property** – The Stiles Avenue Property adjoins the northern boundary of the New Arena Site. The City envisions a portion of this property to be developed into the New Canal Park. A Phase II ESA conducted in 2004 identified lead in the surface soil, subsurface soil, and groundwater at concentrations exceeding applicable regulatory standards. In addition, chromium was detected in the groundwater at a concentration exceeding the MCL. Following the Phase II ESA, a groundwater resampling event was conducted in December 2004. Metals were not detected at concentrations exceeding MCLs in the groundwater samples collected during the resampling event. The local topography suggests that the Stiles Avenue Property is downgradient from the New Arena Site.
- **Norfolk Southern Property** – The Norfolk Southern Property is located across Stiles Avenue and approximately 100 feet northwest from the New Arena Site. The City envisions a portion of this property to be developed into the New Canal Park. A Phase I ESA in September 2006 identified areas of stressed vegetation and evidence of buried debris. A Phase II ESA was not completed for the Norfolk Southern Property.
- **Louisville Road Property** – The Louisville Road property is approximately 900 feet northwest from the New Arena Site. The City envisions a portion of this property to be developed into the New Gateway Park. Historical photographs show several rail sidings and numerous piles of materials on the property between 1951 and 1994. A Phase II ESA conducted in 2004 identified a large amount buried trash and debris on the Louisville Road Property. However, no parameters were detected in the soil or groundwater at concentrations exceeding applicable regulatory criteria.
- **CSXT Property on Feeley Avenue** – The CSXT Property on Feeley Avenue is listed on the Georgia EPD HSI under Site Number 10905 due to a known release of arsenic in soil and groundwater at levels exceeding the reportable quantity. The CSXT property is on the opposite (west) side of Stiles Avenue from the New Arena Site. The local topography suggests that the CSXT property is upgradient from the New Arena Site. Documents obtained from the Georgia EPD indicate that CSXT has recently achieved compliance with the Rules of Hazardous Site Response for groundwater and soil at the property. The property will be eligible for removal from the HSI once the Georgia EPD Director certifies groundwater compliance with RRSs and a Uniform Environmental Covenant is executed prohibiting residential use.
- **Sheppard Pojos (Citgo Gas Station) Site** – The Sheppard Pojos Site is located on the southwest corner of the intersection of West Gwinnett Street and Stiles Avenue, approximately 100 feet west from the southwest corner of the New Arena Site. Regulatory database information indicates that the Sheppard Pojos Site is an active LUST site. A remediation system and monitoring wells can also be seen on the site. Documents obtained from the Georgia EPD indicate that a MPE system operated at the Sheppard Pojos Site until April 2014. A potentiometric surface map for the site show a general groundwater flow direction to the southeast (towards the City Lot) prior to the installation

of the multi-phase extraction (MPE) system. Groundwater quality maps indicate that the benzene groundwater plume has not been delineated along the southeast corner of the Sheppard Pojos Site.

- **Jackson Brothers Service Center (El Cheapo Gas Station) Site** – The Jackson Brothers Site is located on the southeast corner of the intersection of West Gwinnett Street and Stiles Avenue, approximately 100 feet south from the southwest corner of the New Arena. Regulatory database information indicates that the Jackson Brothers Site is an active LUST site. A remediation system and monitoring wells can also be seen on the site. Documents obtained from the Georgia EPD indicate the Jackson Brothers monitoring well network includes three wells (MW-19, MW-20, and MW-21) in the southwest corner of the City Lot. Historically, benzene has been detected in wells MW-19 and MW-21 at concentrations exceeding the Georgia EPD RRS of 0.005 milligrams per liter (mg/L). Potentiometric surface maps indicate that groundwater at the Jackson Brothers Site generally flows to the southeast, away from the City Lot.
- **Savannah Wood Preserving Company, Inc.** – The Savannah Wood site is an active wood preserve manufacturing facility located approximately 200 feet west of the New Arena Site. Regulatory database information indicates that a spill of CCA was reported at the site on June 19, 2000. The SPILLS database information indicates that no waterways were impacted by the release. The local topography suggests that the Savannah Wood site is upgradient from the New Arena Site.
- **Movsovitz of Georgia Facility** – The Movsovitz site is a manufacturing facility located approximately 100 feet west of the New Arena Site. Regulatory database information indicates that the Movsovitz site is listed on the LUST and SPILLS databases. According to the LUST database, two UST releases have been reported at the facility. Both LUST cases have been issued NFA status. The SPILLS database indicates that a release of diesel fuel occurred at the site and impacted the canal. No further information was given concerning the diesel spill. The local topography suggests that the Movsovitz site is upgradient from the New Arena Site.
- **Former Oglethorpe Charter School Site** – The City envisions developing the Savannah Waterworks at the former location of the Oglethorpe Charter School. The Sheppard Pojos Site is directly adjacent to the southeast corner of the Former Oglethorpe Charter School site.

Conclusions

Based on the findings of this environmental review, Terracon is able to provide the following answers to the basic environmental background questions for the New Arena Site and surrounding properties:

- The target tracts have not been adequately investigated. This environmental review identified eight (8) AOCs at the City Lot that are in need of further investigation.
- Contamination has been previously identified at four (4) properties directly adjacent to the target tracts: Sheppard Pojos Site (southwest), Jackson Brothers Site (south), CSXT Property on Freely Avenue (west), and the Stiles Avenue Property (north).
- COCs include petroleum hydrocarbon compounds and heavy metals.
- Historical industrial operations may have impacted soil and groundwater on the adjacent Tenenbaum Property. Contaminated groundwater on the Tenenbaum Property would have the potential to impact the Springfield Canal and New Arena Site.
- The current condition and geographic extent of the existing plume on the Stiles Avenue Property is unknown. Previous environmental assessments did not fully delineate the extent of contamination at the site. A review of Georgia EPD files was completed to determine the current condition and extent of groundwater plumes for the Sheppard Pojos Site, Jackson Brothers Site, and CSXT Property on Feeley Avenue. Groundwater quality and isoconcentration maps for the Sheppard Pojos Site suggest that benzene groundwater impacts have not been delineated in the southeast corner of the property. Groundwater quality and isoconcentration maps for the Jackson Brothers Site show a benzene plume extending onto the southwest corner of the City Lot. Documents reviewed for the CSXT Property on Feeley Avenue indicate that historical detections of arsenic in groundwater at concentrations exceeding the Georgia Hazardous Site Response Act (HSRA) Appendix I Notification Concentrations (NCs) were likely the result of suspended sediments in the samples. Recent analytical data does not indicate the presence of an arsenic plume in the groundwater at the CSXT property.
- Source materials do exist on adjacent contaminated sites. There are no indications of remediation activities having occurred on the Stiles Avenue Property. Remediation systems have been installed at the Jackson Brothers Site and Sheppard Pojos Site. The site plan for the Sheppard Pojos Site shows the installation of an MPE system around the perimeter of the USTs and fuel dispensers. However, documents suggest that the system was deactivated in April 2014 at the request of the EPD. Recent documents also show the presence of free product in several wells at the Sheppard Pojos Site. The site plan for the Jackson Brothers Site shows the installation of extraction wells around the perimeter of the service center. Historical documents show free product in several wells in October 2003, however it is unclear from recent documents if free product remains at the site. Source materials are not likely to exist on the CSXT Property on Feeley Avenue, as approximately 8,628 tons of impacted soil were excavated and removed from the property in August and September 2014. In addition, no constituents were detected at concentrations exceeding Type 1 RRS during two recent groundwater sampling events at the CSXT property. The CSXT Property on Feeley Avenue is likely to be removed from the HSI once the Director of the Georgia EPD concurs with the certificate of compliance

for groundwater and the execution of a Uniform Environmental Covenant prohibiting residential use.

Based on the environmental background information obtained for the target tracts and surrounding properties, Terracon is able to provide the following answers to the environmental engineering questions for the City of Savannah Arena project:

- The Springfield Canal is likely to act as a groundwater divide that would prevent the migration of contaminants to the New Arena Site. However, further study is necessary to confirm that the canal functions as a groundwater divide between the two properties.
- Previous site assessments conducted by Terracon on adjacent properties did not sample surface water within the Springfield Canal. Further study is necessary to determine if the canal is currently contaminated by the migration of contaminants through the surficial aquifer.
- This environmental review did not identify specific information concerning the current groundwater quality of the Springfield Canal. Previous site assessments have identified groundwater contaminants on properties adjacent to the canal (Stiles Ave Property). Further study is necessary to determine the current and future groundwater quality of the canal.
- Proposed utility lines installed within or adjacent to areas of groundwater contamination on the target tracts and/or surrounding properties are likely to serve as preferential pathways for contaminant migration. Further study of proposed utility line routes is necessary to prevent the creation of preferential pathways for the migration of groundwater contaminants.
- The depth of the saturated zone is generally shallow and varies throughout the target tracts and surrounding properties. In addition, previous site assessments have identified wetland areas on the Stiles Avenue and Louisville Road Properties. Ponded surface water is also visible in historical aerial photographs of the LaFarge Site and Tenenbaum Property. Surface water and groundwater is likely to be encountered during the construction of the arena and associated structures. Further study is necessary to identify wetland and shallow groundwater areas on the target tracts and surrounding properties.
- Dewatering activities are likely to be necessary for construction of the arena and other associated structures. Dewatering within or adjacent to areas of contaminated groundwater has the potential to cause or speed up the migration of contaminants into non-or less-impacted areas. Further study is necessary to determine the potential effects of dewatering in areas near groundwater contamination.
- Contaminated groundwater withdrawn from the surficial aquifer during dewatering operations would need to be stored and disposed of in accordance with local, state, and federal regulations. The measures and costs associated with the handling, treatment, and

disposal of contaminated groundwater depends upon the type of contaminants, level of contamination, and volume of contaminated groundwater to be extracted during dewatering activities. Further study is necessary to determine if the nature and extent of groundwater contamination in areas that requiring dewatering for construction.

- Long-term extraction and disposal of contaminated groundwater may be necessary depending on the nature and extent of groundwater contamination on the target tracts and surrounding properties to be developed as part of the City of Savannah Arena project. Further study is necessary to determine the nature and extent of groundwater contamination on the target tracts and surrounding properties.
- Long-term groundwater monitoring and / or remediation may be necessary depending on the nature and extent of groundwater contamination on the target tracts and surrounding properties to be developed as part of the City of Savannah Arena project. Further study is necessary to determine the nature and extent of groundwater contamination on the target tracts and surrounding properties.
- Contaminant barrier walls may be necessary to prevent the migration of groundwater contamination from adjacent properties. Further study is necessary to determine if there is potential for the migration of groundwater contaminants from adjacent properties to the New Arena Site or surrounding Canal District properties.
- Pervious surface improvements in certain areas may enhance recharge and increase groundwater contaminant migration in the surficial aquifer. Further study is necessary to determine the nature and extent of groundwater contamination on the target tracts and surrounding properties.

Recommendations

Target Tracts

Terracon recommends performing a limited site investigation (LSI) for the New Arena Site to evaluate surface soil, subsurface soil, and groundwater conditions in the vicinity of AOCs identified by this environmental review.

- Fueling Station and USTs
- Monitoring Wells
- Suspected UST(s)
- Vehicle Maintenance Shop
- Buried Medical Wastes
- Former Paint Shop
- Former Coal Pocket

- Former Fueling Station

In addition, the LSI should include an assessment of soil, subsurface soil, and groundwater conditions along the boundaries between the New Arena Site and the following adjacent properties with known or suspected groundwater contamination:

- Sheppard Pojos (Citgo Gas Station) Site
- Jackson Brothers Service Center (El Cheapo Gas Station) Site
- Tenenbaum Property
- Stiles Avenue Property

The LSI should also include an assessment of the surface water conditions in the Springfield Canal adjacent to the New Arena Site. In addition, the LSI should include an evaluation of the hydrogeologic characteristics of the canal to determine if it acts as an effective groundwater barrier that would prevent potential migration of contaminants to the New Arena Site.

Terracon also recommends that an asbestos survey be completed by a certified asbestos inspector in accordance with the NESHAP and the AHERA requirements prior to the demolition or renovation of any structures on the City Lot.

Surrounding Properties

Based on the findings of this environmental review, the following actions are recommended for the surrounding properties:

- **Stiles Avenue Property** – Conduct an LSI to determine the nature and extent of lead and chromium impacts previously identified lead in the surface soil, subsurface soil, and groundwater at the site. The LSI should also include an evaluation of groundwater conditions along the boundary with the Tenenbaum property. An updated jurisdictional wetland delineation study is also recommended for the Stiles Avenue Property.
- **Norfolk Southern Property** – Conduct an LSI to evaluate surface and subsurface conditions in areas of stressed vegetation. The LSI should include a subsurface investigation to determine the horizontal and vertical extent of buried debris previously identified at the site.
- **Louisville Road Property** – Conduct an LSI to determine the horizontal and vertical extent of buried debris previously identified at the site. An updated jurisdictional wetland delineation study is also recommended for the Louisville Road Property.

Environmental Review for the City of Savannah Arena Site

City of Savannah ■ Savannah, Chatham County, Georgia

March 15, 2016 ■ Terracon Project No. ES157133



- **Former Oglethorpe Charter School Site** – Conduct an LSI to determine if the UST release at the Sheppard Pojos Site has impacted groundwater or soil vapor conditions at the site.

ENVIRONMENTAL REVIEW

**City of Savannah Arena Site
Stiles Avenue and West Gwinnett Street
Savannah, Chatham County, Georgia**

Terracon Project No. ES157133

March 11, 2016

1.0 INTRODUCTION

It is Terracon's understanding that the City of Savannah (City) plans to build a new arena on two parcels of land located to the north of West Gwinnett Street, between Stiles Avenue and the Springfield Canal (New Arena Site). The City also intends to redevelop adjacent properties to the west of West Boundary Street (Canal District) to create a system of parks, trails, and greenspace to support urban renewal and expansion around the New Arena Site. The location of the New Arena Site and surrounding properties is depicted on Figure 1 in Appendix A.

The initial marketing study suggests developing an arena with an overall seating capacity of 7,500 to 8,500 and an in-stage concert seating capacity of 6,000 to 7,000. In addition, the marketing study indicated that there would only be two to three events per year that would need a seating capacity over 10,000. The marketing study also suggests an adjacent hotel with 150-200 rooms and 2,200 parking spaces within a half mile of the arena. The construction of parking structures could be included in subsequent phases of the project. It is assumed that public transit will account for approximately 10% of the transportation for events.

The target tracts for the new arena and surrounding properties are former or current industrial properties. These properties have the potential for environmental issues that may impact the development of the new arena and the surrounding Canal District. The purpose of this study is to identify potential environment concerns for the target tracts and surrounding properties in order to address the following environmental "background" questions:

- Have the target tracts been adequately investigated?
- Exactly which parcels / geographic areas abutting the target tracts are contaminated?
- What are the contaminants of concern (COCs)?
- What are the current conditions / geographic extents of the existing plumes?
- Does the source material remain at these sites?

Environmental background information for the target tracts and surrounding properties is then used to answer the following environmental "engineering" questions:

- Does the Canal *truly* act as a groundwater divide and prevent / retard migration of contaminants to the east onto the target tracts? If not, have the outer eastern boundaries of the target tracts been adequately assessed?
- Is the surface water within the Canal currently contaminated by the migration of contaminants through the surficial aquifer?
- What is groundwater quality of the Canal today? What do we predict it will be 5 years from now? In 10 years?
- Will the permeable backfill of proposed utility lines (particularly stormwater piping / culverts) serve as preferential pathways for the migration of groundwater contamination?
- Is depth to the saturated zone (“water table”) consistent across the sites? Are the depths a problem for construction?
- If so, will dewatering activities be necessary for construction? Will dewatering draw in or “speed up” the movement of contaminated groundwater into areas known to be “clean” or at least “less impacted”?
- Exactly what measures (and costs) will be required to handle the disposal of groundwater withdrawn from the surficial aquifer during dewatering operations?
- Will long-term dewatering / disposal be necessary?
- Will long-term groundwater monitoring and / or remediation be necessary?
- Will contaminant barrier walls be necessary?
- Could pervious surface improvements be unwise in some locations with regard to recharge of the surficial aquifer / contaminant transport?

The following section describes the scope of services performed by Terracon to address the questions listed above.

1.1 Scope of Services

On behalf of the City, WPC and Terracon had previously performed a number of environmental site assessments for properties on or in the vicinity of the New Arena Site. These environmental site assessment reports have been compiled and reviewed to identify potential environment concerns for the new arena site and surrounding area. For the sake of simplicity, WPC will be referred to as Terracon throughout the report. In addition, Terracon reviewed historical topographic maps, historical aerial photographs, and Sanborn fire insurance maps to determine historical uses and identify potential environmental concerns for the New Arena Site and surrounding properties. Terracon also completed a review of Georgia EPD regulatory files and database information provided by EDR for the new arena site and nearby properties. The purpose of the regulatory database review was to identify environmental conditions that may impact the

New Arena Site and surrounding properties. Historical use documents and environmental database information are provided in Appendix B.

2.0 TARGET TRACTS

The target tracts for the New Arena Site include the City of Savannah Vehicle Maintenance Center (City Lot) and the former LaFarge Concrete Plant (LaFarge Site). The City Lot facility is a 5.68 acre parcel of land (PIN 2-0046-02-001) located at 1100 West Gwinnett Street. The LaFarge Site is a 6.97 acre parcel of land (PIN 2-0030-08-003) located at 620 Stiles Avenue, directly to the north of the City Lot. According to the Chatham County Board of Assessors website, the target tracts are owned by the City.

2.1 City Lot

The City Lot is consists of a mostly paved lot with a number of buildings, structures, and storage areas occupied by the following City departments: Buildings and Electrical Maintenance; Refuse Disposal; Services (Warehouse); Street Maintenance and Sweeping; Traffic Engineering; Vehicle Maintenance; and Water & Sewer Planning & Engineering. The current configuration of the City Lot is depicted in Figure 2.

2.1.1 Site Visit

Terracon conducted a visual reconnaissance of the City Lot on December 17, 2015. At the time of the visit, the site consisted of a Vehicle Maintenance Department shop; Electrical Maintenance Department shop; Traffic Engineering Department office building and garage; Refuse Disposal Department building; Water & Sewer Bureau office building; Water & Sewer Planning & Engineering office building; Water Distribution Department building; water meter shop; and water supply pump station. The northeast corner of the City Lot was unpaved and contained a number of covered and uncovered exterior storage areas for equipment, parts, and supplies. Other notable site features included a fuel pump station with underground storage tanks (USTs), garbage truck wash pad, and a stormwater trench drain along the western boundary of the site. There was also an extensive network of stormwater catch basins throughout the site. A photographic log of the site is provided in Appendix C.

The Vehicle Maintenance Department appears to maintain and repair city owned vehicles and equipment, such as garbage trucks, dump trucks, street sweepers, boom trucks, and trailers. Vehicle Maintenance Department activities include preventative maintenance; major and minor vehicle repair; tire repair and replacement; welding and fabrication; and cleaning, washing, and fueling vehicles and equipment.

The Traffic Engineering Department appears to use the City Lot for storing and maintaining traffic control equipment and supplies, such as signs, barricades, and signals. It has been reported that the Traffic Engineering Department previously operated a paint shop for painting traffic signals and signs. The presumed paint shop building is now occupied by the Refuse Disposal Department.

The Refuse Disposal Department has an office building and maintains a garbage truck washing pad at the City Lot. The garbage truck washing station consists of a concrete pad with a trench drain. Refuse Disposal Department personnel were observed pressure washing the interior and exterior of the garbage trucks on the concrete pad. Residual solid waste generated by the truck cleaning was collected and placed into garbage containers. Wash water collected by the trench drain was discharged into an underground concrete lined pit adjacent to the truck wash station. The Refuse Disposal Department also uses the City Lot for parking garbage trucks and storing garbage containers.

The fueling station is located in the central portion of the City Lot consists of two dispensers, four vent pipes, and two spill kits. Regulatory database information indicates that the City maintains two (2) 10,000 gallon diesel fuel USTs and two (2) 10,000 gallon gasoline USTs at the site. Regulatory database information pertaining to the USTs is discussed in Section 2.1.3 of this report.

Two (2) monitoring wells were observed in the southwest corner of the City Lot. Based on a review of Georgia EPD files for two adjacent LUST sites, these wells appear to be part of the monitoring well network for the Jackson Brothers Service Center (El Cheapo Gas Station). Based on site maps obtained from the Georgia EPD, these wells are likely to be MW-20 and MW-21. The maps also indicate the presence of a third well (MW-19) in the southwest corner of the City Lot. This well was not observed during the site visit. Historical analytical results indicate that benzene has been detected in wells MW-19 and MW-21 at concentrations exceeding the Type 1 RRS for benzene. The monitoring well locations and a summary of groundwater data is presented in Figure 3. The Jackson Brothers Site is discussed in Section 3.7 of this report.

Two circular vaults with uncapped metal pipes cut flush to grade were observed in the concrete pavement adjacent to the northwest corner of the vehicle maintenance shop. In addition, two galvanized metal pipes were observed protruding from the concrete adjacent to a brick wall approximately 10 feet from the circular vaults. These features resemble fill ports and vent pipes for USTs.

2.1.2 Historical Use Information

A historical building constructed with red brick appears to be the oldest structure on the City Lot. The year 1892 is carved in stone above the main entrance to the building. The 1916 Sanborn map identifies the historical building as the Savannah Water Works Gwinnett Street Pumping

Station. The 1916 Sanborn map shows the Savannah Water Works facility consisting of a pump house, boiler house, office area, and a brick chimney. According to the map, the pump house contained a 10 kilowatt (kW) generator and two (2) air compressors. An oil house was adjoined to the northwest corner of the pump house. Adjacent to the east side of the pump house was an overflow tank. Adjacent to the west side of the boiler house was an exterior coal storage area (coal pocket) and rail siding. The City Health Department Fumigating Plant was also adjacent to the west side of the boiler house. The 1916 Sanborn map also shows the City Garbage Crematory to the north of the Water Works building. The City Garbage Crematory consisted of a main room with eight (8) furnaces, tipping room, and a brick chimney. The City Garbage Crematory was fueled by coal and also contained a 75 kW generator. In addition, the map shows a wood shaving vault on the northeast corner of the site. A conveyor pipe connects the wood shaving vault to the J.G. Granbery Planing Mill on the other side of the Springfield Canal. The 1916 Sanborn also shows a pond in the southeast corner of the City Lot.

The 1950 Sanborn map shows that the Savannah Water Works pump house has been converted into a stock room and no longer shows the air compressors, generator, or overflow tank. In addition, the map shows that the boiler room has been converted to general storage and no longer shows the exterior coal pocket area. The City Health Department Fumigating Plant and City Garbage Crematory are also not shown on the 1950 Sanborn map. A small structure shown in the southeast corner of the City Lot is labeled to contain a Layne turbine pump (No.3 Pump) powered with electricity and a standby gas engine. The northern portion of the City Lot is occupied by the Savannah Regional Blood Center operated by the American Red Cross. The Savannah Regional Blood Center consists of two large structures and four smaller structures. The 1950 Sanborn map also shows a gas tank and pump on the west side of the lot adjacent to the rail siding. The gas tank appears to be aboveground and contained by an earthen dam. The pond appears to still be on the City Lot property. The wood shaving vault is no longer shown on the site.

The 1955 Sanborn map shows the construction of a warehouse and shop building to the north of the original Water Works building. In addition, a storage building has been added on to the southeast corner of the stock room. The 1959 Sanborn map shows the addition of a carpenter shop building adjacent to the east side of the gas tank area. In addition, an implement storage building is shown to the east of the warehouse and shop building. The pond is no longer shown on the southeast corner of the City Lot. The 1966 Sanborn map shows that the stock room has been converted to a garage and an addition has been constructed on the west side of the building. The map also shows an expansion of the storage room adjacent to the southeast corner of the garage.

A review of the 1942 topographic map shows a large structure on the southwest corner and two smaller structures on the north end of the City Lot. The large structure appears to be the same general configuration and location as the current brick building on the site. The 1942 map also shows the City Lot property bound to the west by Stiles Avenue, to the south by West Gwinnett

Street, to the north by Dixon Street (Hoover Street), and to the east by the Springfield Canal. The 1955 map shows a second large structure to the north of the brick building. The two small structures are no longer shown on the north end of the site, however two smaller structures are shown in the northwest corner of the site. Dixon Street is also not shown on the 1955 topographic map. The 1971 map shows an expansion of the original site building and the addition of three structures on the northern portion of the site and one structure on eastern portion of the site. The two smaller structures are no longer shown in the northwest corner of the City Lot. The 1978 topographic map shows two additional smaller structures in the southeast corner of the City Lot.

2.1.3 Regulatory Database Review

A review of regulatory database information provided by EDR indicates that the City Lot is listed on the Underground Storage Tank (UST) and Leaking UST (LUST) databases. According to the UST database, the City of Savannah maintains four (4) USTs on the City Lot: two (2) 10,000 gallon diesel fuel tanks and two (2) 10,000 gallon gasoline tanks. The database indicates that the tanks are double walled and were installed on May 1, 1997. In addition, the UST database shows that the following USTs were removed from the City Lot on May 1, 1997: three (3) 10,000 gallon diesel fuel tanks and one (1) 10,000 gallon gasoline tank. According to the UST database, the former USTs were constructed out of galvanized steel and were installed on the City Lot property on March 12, 1974. The LUST database indicates that two UST releases have been reported at the facility. The first release was reported on February 16, 1996 and the cleanup status is listed as “No Further Action” (NFA). The second release was reported on July 30, 1997 and the cleanup status is also listed as NFA. No further information pertaining to the City Lot is provided in the UST and LUST database listings.

2.2 Former LaFarge Concrete Plant Site

The LaFarge Site occupies the northern portion of the New Arena Site. The site is currently vacant with one small building, one large vertical tank, several stormwater retention structures, a number of concrete foundations, and remnants of concrete plant equipment. According to the Chatham County Board of Assessors website, the LaFarge Site was sold to the City on July 31, 2012. The Property Record Card indicates that a 2,000 gallon diesel fuel tank was maintained at the facility. The current configuration of the LaFarge Site is depicted in Figure 2.

2.2.1 Historical Use Information

A review of the 1916 Sanborn map shows that the southeast corner of the LaFarge Site was occupied by the Queen City Ink Co. Resin Oil Plant. The resin oil plant consisted of an office building, three still tubs, and two tanks and three stills on a wood trestle. The resin oil plant is not shown on the 1950 Sanborn map nor is it visible on the 1951 aerial photograph.

A review of historical aerial photographs indicate that the site was first developed as a concrete plant sometime between 1951 and 1968. The property appeared to consist of agricultural land in the 1951 aerial photograph. Historical aerial photographs also suggest that the concrete plant was in operation until at least 2007. A number of structures and buildings were demolished and removed from the site sometime between 2011 and 2014.

2.2.2 Phase II Environmental Site Assessment - 2005

In August and September 2005, Terracon performed a Phase II Environmental Site Assessment (ESA) at the Lafarge Site. The Phase II ESA report indicated that a Phase I ESA was not performed for the LaFarge Site. Several of the LaFarge Concrete employees indicated that the western side of the property was previously part of an old city landfill. The Phase II ESA scope of work consisted of test pits, soil sampling, monitoring well installation, and groundwater sampling.

A total of five test pits were completed to characterize the condition of the soil and material below grade. The test pits ranged in depth from 5 to 7 feet below grade. No buried trash or debris that would indicate the presence of a former landfill was encountered during the excavation of the test pits. However, much of the site was covered with concrete and subsurface investigation activities were limited to certain accessible areas. The piles of concrete were identified as a potential concern for future development.

A total of five soil samples were collected from the subject site. The soil samples were analyzed for VOCs by United States Environmental Protection Agency (USEPA) Method 8260, SVOCs by USEPA Method 8270, polynuclear aromatic hydrocarbons (PAHs) by USEPA Method 8270C, total petroleum hydrocarbons (TPH) diesel range organics (DRO) by USEPA Method 3546, RCRA metals by USEPA Method 6010, and benzene, toluene, ethylbenzene, and xylenes (BTEX) by USEPA Method 8021B. Analytical results indicated that several metals, volatile and semi-volatile organic constituents were detected in the soil samples. However, none of the parameters were reported at concentrations exceeding the Georgia Hazardous Site Response Act (HSRA) Appendix I Notification Concentrations (NCs).

Three temporary monitoring wells were installed in order to collect groundwater samples for laboratory analysis. The groundwater samples were analyzed for VOCs by USEPA Method 8260, SVOCs by USEPA Method 8270, PAHs by USEPA Method 8270C, BTEX by USEPA Method 8021B, and total and dissolved RCRA metals by USEPA Method 6010. Analytical results indicated that none of the parameters were reported at concentrations exceeding the USEPA Maximum Contaminant Levels (MCLs).

3.0 SURROUNDING PROPERTIES

3.1 Tenenbaum Property

The Tenenbaum Property consists of a 29.1 acre parcel of land (PIN 2-0046-03-011) directly adjacent to the east side of the proposed New Arena Site. The Springfield Drainage Canal runs along the boundary between the Tenenbaum Property and the New Arena Site. The Tenenbaum Property is bound to the south by West Gwinnett Street, to the east by the Chatham Steel Corporation (Chatham Steel) facility, and to the north by a rail siding leading to the Chatham Steel facility.

3.1.1 Historical Use Information

A review of the 1916 Sanborn map shows Philbot Avenue along the western boundary of the Tenenbaum Property and directly adjacent to the Springfield Canal. The Sanborn map also shows the Haysman Lumber Company and the J.G. Granbery Planing Mill on the southwest corner of the site. The Haysman Lumber Company consisted of a saw mill, planing mill, lumber shed, dressed lumber storage, office building, log skids, and a number of lumber piles. The J.G. Granbery Planing Mill consisted of a planing mill, shaving vault, dressed lumber storage, and several piles of lumber. The J.G. Granbery Planing Mill also had a conveyor system that transferred wood shavings across the Springfield Canal to a shavings vault located on the City Lot. Philbot Avenue and the two lumber companies are not shown on the 1950 Sanborn map nor are they visible on the 1951 aerial photograph.

A review of the historical aerial photographs indicated that Chatham Steel was conducting industrial activities on the Tenenbaum Property prior to 1951 and continued until at least 1994. The 1951 aerial photograph shows an industrial facility on the southeast corner of the site that appears to be associated with Chatham Steel operations. In addition, several smaller structures are visible in the northern portion of the site. Two railroad side tracks cross the site and connect to the adjacent Chatham Steel facility. Chatham Steel appeared to be using the Tenenbaum Property to store, load and unload materials from railcars. A number of tractor trailers or storage containers appear to be staged on the southwest corner of the site. A drainage canal crosses the central portion of the property from south to north and eventually drains into the larger Springfield Canal approximately 1,000 feet to the north of the site. The southwest corner of the site appears to be mostly clear of industrial activity except for several storage containers or tractor trailers staged along the bank of the Springfield Canal. The 1968 photograph shows a significant increase in industrial activity on the Tenenbaum Property. Four additional railroad side tracks are shown on the northwestern portion of the site. In addition, numerous piles of material and debris (presumably scrap metal) are visible along the side tracks. The industrial facility previously noted on the southeast corner of the site has been removed and replaced with piles of material and debris. The drainage canal has been rerouted to cross the western portion of the site before

draining into the Springfield Canal. Site conditions shown in the 1971 aerial photograph are similar to the 1968 aerial photograph. The 1981 photograph shows that a rail siding has been added to the southwest corner of the site. In addition, numerous piles of material and debris are visible on the southwest portion of the property. Several large piles of a dark material noted on the southwest corner of the site could potentially be coal used to fire a smelter or the resulting ash. The 1988 and 1994 aerial photographs show the same general materials and activities present on the site. The 2005 aerial photograph shows that industrial activities have ceased on the majority of the site and the rail side tracks have been abandoned and possibly removed. The piles of material and debris also appear to have been removed from the Tenenbaum Property. The site appears to be mostly covered with vegetation with several dirt roadways. A concrete pad with remnants of a control tower is visible in the southwest portion of the site. Chatham Steel appears to be using the east side of the site for the parking tractor trailers, staging storage containers, railroad siding, and portions of two buildings. The outline of the canal is visible but it does not appear to be activity draining water to the Springfield Canal. Standing water is visible in certain areas of the northern portion of the site. The 2006, 2007, 2009, 2010, and 2011 aerial photographs show the same general activities present on the site.

3.2 Stiles Avenue Property

The Stiles Avenue Property consists of an approximately 20.7 acre area of land to the north and northeast of the proposed new arena development area. According to the City's Civic Vision Plan for the West Boundary Canal District (dated October 17, 2013), a portion of this Stiles Avenue Property will be developed into the New Canal Park. The site is bound to the southwest by the LaFarge Site, to the southeast by the Tenenbaum Property, to the east by Highway 17, to the north by undeveloped property, and to the west by Stiles Avenue. A rail siding servicing Chatham Steel is directly adjacent to the southern boundary of the site. The Springfield Drainage Canal crosses the central portion of the site. According to the Chatham County Board of Assessors website, the Stiles Avenue Property is owned by the City and consists of parcels identified as PINs 2-0030-08-01, 2-0030-08-005, and 2-0030-08-006.

3.2.1 Historical Use Information

A review of the historical aerial photographs show that the Stiles Avenue Property consisted mostly of undeveloped or agricultural land in 1951. An unnamed drainage canal crosses the eastern portion of the site. The site is almost entirely bound by railroad track sidings. Several of these rail sidings cross the Stiles Avenue Property to service nearby industrial facilities. One small structure and several pieces of equipment are visible on the central portion of the site. The structure and equipment were not visible in the 1968 or subsequent aerial photographs. The site appeared to remain relatively unchanged in the 1971, 1981, and 1988 aerial photographs. The 1994 aerial photograph shows a dirt road crossing the eastern portion of the site from Stiles Avenue to the Springfield Canal. The roadway is not visible in the 2005 aerial photograph and

the site is mostly covered with dense vegetation. Site conditions appear to remain relatively unchanged in the 2006, 2007, 2009, 2010, and 2011 aerial photographs.

3.2.2 Phase I ESA – 2004

A Phase I ESA was conducted for the Stiles Avenue Property by Geotechnical & Environmental Consultants, Inc. (GEC) in 2004. The Phase I ESA identified several potential environmental conditions. The Phase I ESA indicated that the Stiles Avenue Property was previously owned by CSX Transportation, Inc. (CSXT) and the National Oil Company (NOC) was formerly situated on the eastern portion of the property. During the site reconnaissance, debris was observed throughout the site, including piles of rubber tires, demolition debris, railroad cross-ties, garbage, unmarked containers, and 55-gallon drums. In addition, the Phase I ESA noted the presence of discolored soils, stressed vegetation, a discarded UST and a disintegrated railcar tanker. The Phase I ESA also identified brick saddles on the Stiles Avenue Property, which NOC may have previously used to support ASTs containing petroleum products. The Phase I ESA also outlined several areas of the site which may qualify as jurisdictional wetlands.

3.2.3 Phase II ESA – 2004

Following the Phase I ESA, Terracon conducted a Phase II ESA of the Stiles Avenue Property in October and November 2004. The Phase II ESA scope of work included wetlands delineation, asbestos survey, lead paint survey, soil sampling, temporary monitoring well installation, and groundwater sampling.

A large jurisdictional wetland was identified in the middle third of the Stiles Avenue Property. Terracon also prepared Jurisdictional Determination Package (Appendix II of the Phase II ESA Report) for submittal to the U.S. Army Corps of Engineers (USACE).

An asbestos survey was conducted by a certified asbestos inspector in accordance with the National Emissions Standard for Hazardous Air Pollutants (NESHAP) and the Asbestos Hazard Emergency Response Act (AHERA) requirements. A total of ten (10) samples were collected from building materials located throughout the Stiles Avenue Property. The samples were analyzed for asbestos using USEPA 600/R-93/116, Polarized Light Microscopy. No asbestos was identified in the 10 samples collected from the site.

The lead based paint (LBP) survey included the collection of two paint chip samples were collected from building materials on the Stiles Avenue Property. The paint chip samples were analyzed for lead by Toxic Characteristic Leaching Procedure (TCLP) and USEPA Method 7420. Lead was not detected in either sample at a concentration exceeding the USEPA regulatory standard of 5.0 milligrams per liter (mg/L).

A total of seven (7) soil samples were collected from the Stiles Avenue Property. Two (2) surface soil samples were collected from hand auger borings advanced to a depth of approximately 1 foot below the ground surface (bgs). Five (5) composite soil samples were collected from the drill cuttings for the monitoring wells installed on the site. The soil samples were analyzed for Volatile Organic Compounds (VOCs) by USEPA Method 8260, Semi Volatile Organic Compounds (SVOCs) by USEPA Method 8270, and Resource Conservation and Recovery Act (RCRA) metals by USEPA Method 6010. Analytical results indicated that several VOCs and SVOCs were detected in the surface soil samples. However, none of the parameters were reported at concentrations exceeding the Georgia HSRA Appendix I NCs. Metals such as barium, chromium, lead, arsenic, selenium and mercury were detected in the soil samples at concentrations below the GA HSRA Appendix I NCs. Lead was detected at concentrations exceeding the GA HSRA Appendix I NC in both surface soil samples and one composite subsurface soil sample (B-2).

Five (5) temporary monitoring wells were installed in order to collect groundwater samples for laboratory analysis. The groundwater samples were analyzed for VOCs by USEPA Method 8260, SVOCs by USEPA Method 8270, and RCRA metals by USEPA Method 6010. Analytical results indicated that chloromethane was detected in groundwater sample B-5 at a concentration of 0.0086 mg/L. There is no MCL for chloromethane. No other VOCs or SVOCs were detected in the other four groundwater samples. Metals including arsenic, barium, chromium, lead and silver were in the five groundwater samples. Lead was detected at concentrations exceeding the published MCL of 0.015 mg/L in groundwater samples B-2, B-3, B-4 and B-5. Chromium was detected at concentrations exceeding the published MCL of 0.1 mg/L in groundwater samples B-2, B-3 and B-4. No other metals were detected at concentrations exceeding the MCLs.

3.2.4 Groundwater Resampling Event – 2004

The Phase II ESA analytical results indicated concentration of lead exceeding the MCL in the groundwater sample collected from temporary well B-5. As a result, Terracon remobilized to the site in December 2004 to resample wells B-2 through B-5 for total and dissolved RCRA metals. No metals were detected at concentrations exceeding MCLs in the samples collected from the four wells.

3.3 Norfolk Southern Property

The Norfolk Southern Property consists of approximately 13.52 acres of undeveloped land located between Stiles Avenue and Magazine Avenue. The site is bound to the north and south by railroad tracks. According to the Chatham County Board of Assessors, the Norfolk Southern Property was split into two parcels in January 2007 (PINs 2-0030- 07-001 and 2-0030- 07-004). The western portion of the site (2-0030- 07-001) is owned by Norfolk Southern. The eastern portion of the site (PIN 2-0030- 07-004) is approximately 4.05 acres and was purchased by the City. According to the City's Civic Vision Plan for the West Boundary Canal District (dated October 17, 2013), the eastern portion of the Norfolk Southern Property will be part of the New Canal Park.

3.3.1 Historical Use Information

A review of the 1951 aerial photograph shows several small structures on the west side of the Norfolk Southern property. In addition, an unpaved road and a small building are visible in the northeast corner of the site. The remaining portions of the site appear to be undeveloped vacant land with several drainage ditches. The roadway and unpaved building noted in the northeast corner of the site are no longer visible on the 1968 aerial photograph. The 1968 aerial photograph does show small structures in the northeast and southeast corners of the site. An area of sparse vegetation is also visible in the central portion of the site. This area of sparse vegetation is persistent throughout the aerial photographs taken between 1968 and 2011. Site conditions appear to remain relatively unchanged in the 1971 aerial photograph. The small structures on the west side and southeast corner of the site are no longer visible in the 1981 aerial photograph. Site conditions appear to remain unchanged between the 1988 and 2011 aerial photographs, with the exception of gradual vegetation growth on the eastern and western portions of the site.

3.3.2 Phase I ESA – 2006

Terracon conducted a Phase I ESA of the Norfolk Southern Property in September 2006. The site reconnaissance identified several areas of stressed vegetation and barren patches of grass in the western portion of the Norfolk Southern Property. Additionally, evidence of buried debris was also noted in the western portion of the site. These areas were identified as recognized environmental conditions (RECs) and a Phase II ESA was recommended for the Norfolk Southern Property.

3.4 Louisville Road Property

The Louisville Road Property consists of 9.14 acres of vacant industrial land located to the northwest of the proposed arena development area. According to the Chatham County Board of Assessors website, the site is identified as PIN 2-0029-07-012 and was sold to the City of Savannah on December 15, 2004. The Property Record Card indicates that a portion of the site is secured by a 6-foot tall chain link fence topped with three strands of barbed wire. The Louisville Road Property was formerly owned by the Norfolk Southern Railway Company. According to the City's Civic Vision Plan for the West Boundary Canal District (dated October 17, 2013), the Louisville Road Property will be part of the New Gateway Park.

3.4.1 Historical Use Information

A review of the 1951 aerial photograph shows indications of industrial activity on the Louisville Road Property. A number of small structures are visible along Louisville Road on the north side of the site and Dooley Avenue on the east side of the site. In addition, two rail sidings cross the site to provide railroad access to the adjacent industrial facility on the east side of Dooley Avenue.

The remaining portion of the site appears to be undeveloped. The structures along Louisville Road and Dooley Avenue are no longer visible in the 1968 aerial photograph. There are also indications of land disturbance activities throughout the site. The 1971 aerial photograph shows numerous piles of materials and debris throughout the site. In addition, several small structures are visible in the northwest corner of the Louisville Road Property. The 1981 aerial photograph shows a decrease in overall industrial activity and the removal or abandonment of one rail siding. One large pile of material is visible in the central portion of the site. The structures noted in the northwest portion of the site are no longer visible. The remaining portion of the site appears to consist of vacant land. Site conditions appear to be similar in the 1988 aerial photograph. The 1994 aerial photograph shows the removal or abandonment of the second rail spur. The site appears to consist of densely vegetated land with small cleared area adjacent to Louisville Road. The 2005 aerial photograph shows a paved lot used for storage of materials in the northwest corner of the site. The 2009 aerial photograph shows a second storage yard on the east side of the Louisville Road Property. The storage yard appears to be used for staging shipping containers and miscellaneous materials and equipment. Site conditions appear to remain relatively unchanged in 2010 and 2011 aerial photographs.

3.4.2 Phase II ESA – 2004

Terracon conducted a Phase II ESA of the Louisville Road Property in November 2004. At the time of the Phase II ESA, the site was undeveloped with several building foundations and a large amount of building debris located throughout the Louisville Road Property. The subject site appeared to be relatively flat with several low lying areas. A jurisdictional freshwater wetland was present on the site and extended along the southern property boundary adjacent to the off-site drainage canal, south of the site. The Phase II ESA scope of work consisted of test pits, soil sampling, monitoring well installation, and groundwater sampling.

A total of nine (9) test pits were completed to characterize the condition of the soil and material below grade. The test pits ranged from 0 to 4 feet in depth and revealed a large amount of construction material and trash buried throughout the site. The large amount of debris indicates that the site has been extensively backfilled, and possibly used as a landfill for construction and demolition debris.

Two (2) composite soil samples were collected from the drill cuttings for the monitoring wells (B-2 and B-4) installed on the Louisville Road Property. The soil samples were analyzed for VOCs by USEPA Method 8260, SVOCs by USEPA Method 8270, and RCRA metals by USEPA Method 6010. Analytical results indicated that several VOCs, SVOCs, and metals were detected in the composite soil samples. However, none of the parameters were reported at concentrations exceeding the Georgia HSRA Appendix I NCs.

Four (4) temporary monitoring wells were installed in order to collect groundwater samples for laboratory analysis. The groundwater samples were analyzed for VOCs by USEPA Method 8260,

SVOCs by USEPA Method 8270, and RCRA metals by USEPA Method 6010. Analytical results indicated that chlorobenzene was detected in groundwater sample TMW-3 at a concentration of 0.0026 mg/L, below the MCL of 0.1 mg/L. In addition, acetone was detected in groundwater sample TMW-2 at a concentration of 0.027 mg/L. There is no MCL for acetone. No other VOCs or SVOCs were detected in the other three (3) groundwater samples. Metals including arsenic, barium, chromium, lead, silver and selenium were detected at concentrations below the published MCLs.

3.5 CSXT Property on Feeley Avenue

The CSXT Property on Feeley Avenue (CSXT Property) is listed on the Georgia Environmental Protection Division (EPD) Hazardous Site Inventory (HSI) under Site Number 10905 due to a known release of arsenic in soil and groundwater at levels exceeding the reportable quantity. This site is located within the CSXT railroad right-of-way on the south side of Feeley Avenue between Magazine Avenue and Stiles Avenue. The site is on the west side of Stiles Avenue, directly across the road from the LaFarge Site. The CSXT Property consists of two parcels (PINs 2-0047-13-001 and 2-0047-14-001) equaling approximately 4.62 acres

The CSXT Property was listed on the HSI on March 25, 2010 and has been designated as a Class II site. According to the HSI Summary Sheet, the Georgia EPD has not yet directed the responsible parties to begin investigation or cleanup activities under the HSRA. The Georgia EPD Director's determination regarding corrective action is pending.

Historical aerial photographs taken between 1951 and 1988 show the site consisting of a number of tracks within the railroad right-of-way. The 1971 aerial photograph shows the industrial facility at 313 Stiles Avenue using a portion of the site for parking tractor trailers and other vehicles. The tracks appear to have been removed from the site sometime between 1988 and 1994. The adjacent industrial facility at 313 Stiles Avenue appears to have stopped using a portion of the site for parking sometime between 1994 and 2005. The aerial photographs between 2005 and 2011 show the site to be a vacant area of land covered with vegetation. The 2014 aerial photograph shows bare soil and an absence of vegetation on the western portion of the site, suggesting the recent occurrence of earth moving activities.

3.5.1 Georgia EPD File Review

Terracon performed a review of environmental documents that have been submitted to the Georgia EPD for the CSX Feeley Avenue site. The purpose of the file review was to determine the nature and extent of groundwater contamination associated with the CSXT property. Georgia EPD file review documents are provided in Appendix D.

Geosyntec Consultants (Geosyntec) prepared a Summary of Groundwater Analytical Results report that was submitted to the Georgia EPD on July 29, 2014. The report summarizes the results of two groundwater sampling events conducted in April 2013 and April 2014. The purpose

of these groundwater sampling events was to confirm the detection of arsenic at concentrations exceeding the notification concentration in two wells during a site investigation performed in August 2009. During the April 2013 and April 2014 events, groundwater samples were collected from two wells (MW-1 and MW-2) and analyzed for PAHs, copper, chromium, arsenic, and lead. Laboratory analytical results did not indicate any detections of constituents at concentrations exceeding Type 1 Risk Reduction Standards (RRS). The report concluded that historical elevated detections of arsenic in the site groundwater were the result of suspended sediments in the samples. Geosyntec requested the EPD to confirm that no additional groundwater assessment is needed and that the existing onsite wells can be abandoned.

A Statement of Findings prepared by Geosyntec in November 2014 indicated that arsenic, lead, and benzo(a)pyrene had been detected at concentrations exceeding Type 3/4 RRSs in surface and subsurface soils at the CSXT Feeley Avenue site. Between August 19, 2014 and September 5, 2014, approximately 8,628 tons of impacted soil was excavated and disposed off-site at Waste Management's Superior Landfill located in Savannah, Georgia. Following the soil excavation, Geosyntec proposed no further action for soil and groundwater at the site.

In a letter dated June 9, 2015, the Georgia EPD indicated that a Compliance Status Report (CSR) is needed to certify compliance with RRSs for groundwater in order to remove the property from the HSI. In addition, the Georgia EPD indicated that soil at the property has been certified to be in compliance with non-residential RRSs and a Uniform Environmental Covenant that prohibits residential use is needed.

In a letter dated November 23, 2015, the Georgia EPD acknowledged receiving the CSR for groundwater compliance at the CSXT Feeley Avenue property. The Georgia EPD found the groundwater CSR to be complete with respect to the Rules for Hazardous Site Response. The property will be eligible for removal from the HSI once the Director of the Georgia EPD concurs with the certificate of compliance for groundwater and a Uniform Environmental Covenant is executed prohibiting residential use.

3.6 Sheppard Pojos (Citgo Gas Station) Site

The Shepard Pojos site is an active Citgo gas station at 1302 West Gwinnett Street. The gas station is on the west side of Stiles Avenue and directly across the street from the City Lot. The site consists of a single parcel (PIN 2-0046-01-007) equaling approximately 0.18 acres.

A review of regulatory database information provided by EDR indicates that the Sheppard Pojos Site is listed on the UST and LUST databases (Facility ID 670400). According to the UST database, Sheppard Pojos maintains three (3) USTs on site: one (1) 6,000 gallon gasoline tank and two (2) 4,000 gallon gasoline tanks. The database indicates that the tanks are constructed with steel and are cathodically protected. The tanks are listed as being installed on May 14, 1982 and are currently in use. The LUST database indicates that a UST release was reported at the

facility on July 18, 2002. The cleanup status of the LUST is listed as “In Remediation”. No further information pertaining to the USTs and LUST is provided by the EDR report.

3.6.1 Georgia EPD File Review

Terracon performed a review of environmental documents that have been submitted to the Georgia EPD for the Sheppard Pojos Site. The purpose of the file review was to determine the nature and extent of groundwater contamination associated with the LUST site. Georgia EPD file review documents are provided in Appendix D.

Documents obtained from the Georgia EPD include soil quality map, groundwater quality maps, potentiometric surface maps, free product recovery table, operation & maintenance (O&M) site visit summary table, data summary tables, and a hydrograph. Potentiometric surface maps indicate that groundwater at the Sheppard Pojos Site was flowing to the northeast in March 2004 and March 2013, towards Stiles Avenue and the New Arena Site. A potentiometric map from April 2012 shows groundwater flowing to the south, which may be due to the operation of a multi-phase extraction (MPE) system. The groundwater quality map for March 2013 suggests that benzene has not been delineated in the southeast corner of the Sheppard Pojos site, adjacent to the northwest corner of West Gwinnet Street and Stiles Avenue. The March 2013 groundwater quality map also shows a MPE system with 13 extraction wells installed around the perimeter of the USTs and fuel dispensers. The O&M summary table shows the deactivation of the MPE system and completion of a 24-hour Mobile Enhanced Multi-Phase Extraction (MEME) event in April 2014.

3.7 Jackson Brothers Service Center (El Cheapo Gas Station) Site

The Jackson Brothers Service Center (Jackson Brothers Site) is an active El Cheapo gas station at 1141 West Gwinnett Street. The gas station is on the south side of West Gwinnett Street and directly across the road from the City Lot. The site consists of a single parcel (PIN 2-0046-04-018) equaling approximately 1.6 acres.

A review of regulatory database information provided by EDR indicates that the Jackson Brothers Site is listed on the UST and LUST databases (Facility ID 4250246). According to the UST database, Sheppard Pojos maintains two (2) USTs: one (1) 8,500 gallon gasoline tank and one (1) 3,500 gallon gasoline tank. The database indicates that the tanks are constructed with fiberglass and equipped with overfill protection and spill prevention devices. The tanks are listed as being installed on December 1, 2003 and are currently in use. The LUST database indicates that a UST release was reported at the facility on July 26, 1999. The cleanup status of the LUST is listed as “NFA - Remediation”. No further information pertaining to the active USTs and LUST is provided by the EDR report.

3.7.1 Georgia EPD File Review

Terracon performed a review of environmental documents that have been submitted to the Georgia EPD for the Jackson Brothers Site. The purpose of the file review was to determine the nature and extent of groundwater contamination associated with the LUST site. Georgia EPD file review documents are provided in Appendix D.

Documents obtained from the Georgia EPD include site maps, soil quality map, groundwater quality maps, and potentiometric surface maps. The figures for the Jackson Brothers Site also show the adjacent Sheppard Pojos Site. The Jackson Brothers Site map shows 18 recovery wells installed around the perimeter of the Jackson Brothers Service Center. The site map also shows three monitoring wells (MW-19, MW-20, and MW-21) for the Jackson Brothers Site are installed on the New Arena Site. Potentiometric surface maps indicate that groundwater at the Jackson Brothers Site generally flows to the southeast, away from the New Arena Site. Groundwater quality and isoconcentration maps show a benzene groundwater plume extending from the Jackson Brothers Site onto the southwest corner of the New Arena Site. During the October 2003 groundwater sampling event, benzene was detected two wells on the New Arena Site (MW-19 and MW-21) at concentrations of 0.0178 mg/L and 0.126 mg/L, which exceeds the Georgia EPD Type 1 RRS of 0.005 mg/L. The June 2013 groundwater quality map shows a detection of benzene at a concentration of 0.230 mg/L in monitoring well MW-19, which also exceeds the Type 1 RRS. Monitoring well MW-21 was not sampled in June 2013. A summary of groundwater data for the monitoring wells on the City Lot are presented in Figure 3.

3.8 Savannah Wood Preserving Company, Inc.

The Savannah Wood Preserving Company, Inc. (Savannah Wood) is located at 501 Stiles Avenue, directly across the road from the LaFarge Site. The site consists of five (5) parcels (2-0047-14-005, 2-0047-14-007, 2-0047-14-008, 2-0047-21-011, and 2-0047-22-003) equaling approximately 3.22 acres.

The 1916 Sanborn map shows the site occupied by the Savannah Excelsior & Planing Mill. No structures are shown on the Savannah Wood site on the 1950, 1953, and 1955 Sanborn maps. In addition, the 1951 aerial photograph shows that the site is vacant. The 1959 Sanborn map shows a lumber yard for the Savannah Celcurfwood & Preserving Company at the site, however no structures are shown. The 1963 Sanborn map indicates the site is occupied by Savannah Celcure Wood Preserving Company, which consists of a lumber yard and a curing building with a tank and a vat. No changes to the site are noted on the 1966 Sanborn map. The 1968 aerial photograph show the curing building and lumber yard at the site. No significant changes to the site are noted on the 1971, 1981, and 1988 aerial photographs. The 1994 aerial photograph shows the addition of three buildings on the east side of the site. In addition, the lumber yard previously noted on the west side of the site is no longer visible. The 2005 aerial photograph shows the addition of a fifth building on the southern portion of the site. Site conditions appear to

be generally unchanged in the aerial photographs taken between 2005 and 2011. The 2014 aerial photographs show three additional buildings on the site and significant exterior lumber storage.

A review of regulatory database information provided by EDR indicates that the Savannah Wood Site is listed on the SPILLS, RCRA Non-Generator (NonGen) / No Longer Regulated (NLR), Facility Index System (FINDS), National Pollutant Discharge System (NPDES), and TIER 2 reporting databases. According to the SPILLS database listing, a release of chromated copper arsenate (CCA) was reported at the site on June 19, 2000. The SPILLS database information indicates that no waterway was impacted. No further information pertaining to the CCA spill was provided by the EDR report. The RCRA NonGen / NLR database listing indicates that the facility was a historical generator of arsenic acid. The database shows that the facility had a violation on March 19, 1993 and a final compliance order was received on October 18, 1993, which included a penalty of \$3,000. The NPDES database indicates that the facility has a discharge permit under Notice of Intent (NOI) number 12560. The TIER 2 database shows that the facility filed a Tier 2 report in 2012, however no specific chemicals are listed in the database.

3.9 Movsovit of Georgia Facility

The Movsovit of Georgia (Movsovit) facility is located at 313 Stiles Avenue, directly across the road from the LaFarge Site. The site consists of an approximately 3.6 acre parcel (2-0030-07-003) improved with a single industrial building.

A review of regulatory database information provided by EDR indicates that the Movsovit facility is listed on the LUST and SPILLS database. According to the LUST database, two UST releases have been reported at the facility (Facility ID 4250374). The first release was reported on January 21, 1998 and the cleanup status is listed as NFA. The second release was reported on July 11, 2002 and the cleanup status is also listed as NFA. No further information pertaining to the UST releases is provided by the EDR report. The SPILLS database indicates that a release of diesel fuel occurred at the site and impacted the Springfield Canal. No further information regarding the spill was included in the EDR report.

Historical aerial photographs show that the facility was constructed sometime between 1951 and 1968. No significant changes to the Movsovit site were noted in the aerial photographs taken between 1968 and 2014.

3.10 Savannah Steel Scaffold Co., Inc.

The Savannah Steel Scaffold Co., Inc. (Savannah Scaffold) is located at 615 Stiles Avenue, directly across the road from the LaFarge Site. According to the Chatham County Board of Assessors, the Savannah Scaffold site is owned by Highsmith Lumber Co., Inc. and consists of a single parcel (2-0047-22-001) equaling approximately 7.3 acres.

The 1916 Sanborn map shows the site occupied by the Highsmith Lumber Yard and General Work Shop. Structures shown on the 1916 map include a sawing & planing mill, two lumber sheds, feed storage building, shavings vault, two rail sidings, and a number of lumber piles. The 1950 Sanborn map shows the addition of a carpentry building, millwork building, shavings bin, and three smaller lumber storage sheds. The 1951 aerial photograph also shows these structures on the Savannah Scaffold site. The two large lumber storage sheds and numerous lumber piles are no longer shown on the 1950 Sanborn map. No significant changes to the Savannah Scaffold site are shown on the 1953 Sanborn map. The 1955 Sanborn map shows the addition of a material storage building south of the carpenter shop. The 1959 Sanborn map shows the addition of a lumber shed adjacent to the east side of the millwork building. No significant changes to the Savannah Scaffold site are shown on the 1963 and 1966 Sanborn maps. The 1968 aerial photograph also shows similar conditions at the Savannah Scaffold site. The 1971 aerial photograph shows a large building added to the south-central portion of the site. The 1981 aerial photograph shows the addition of several more buildings in the southwest corner of the site. 1994 aerial photograph shows the expansion of the building in the south-central portion of the site. The 2005 aerial photograph shows the addition of a building on the western portion of the site. Conditions at the Savannah Scaffold site appear to be generally unchanged in the aerial photographs taken between 2005 and 2014.

A review of regulatory database information provided by EDR indicates that the Savannah Scaffold site is listed on the UST and FINDS databases. According to the UST database listing, a 1,000-gallon gas UST was installed at the site in 1976 and removed from the ground in 1994. No further information pertaining to the UST was provided by the EDR report.

4.0 FINDINGS

4.1 Target Tracts

The following on-site areas of concern (AOCs) were noted for the City Lot and LaFarge Site (target tracts) based on the review of previous environmental assessment reports, historical use documents, environmental regulatory database information, and site reconnaissance. The AOCs identified on the target tracts are depicted on Figure 4.

- **Fueling Station and USTs** – An active fueling station with four (4) USTs is currently on the City Lot. In addition, regulatory database information indicates that two (2) UST releases have been reported at the City Lot. Both LUSTs have been issued NFA letters. However, there is the potential for petroleum impacted soil and groundwater to be encountered during the excavation and removal of the active fueling station and USTs.
- **Monitoring Wells** – Two (2) monitoring wells were observed on the southwest corner of the City Lot and downgradient from two off-site LUST sites. The presence of these wells

suggest that one or both of the adjacent LUST sites have impacted groundwater at the City Lot.

- **Suspected UST(s)** – Two circular vaults with uncapped metal pipes cut flush to grade were observed in the concrete pavement adjacent to the northwest corner of the vehicle maintenance shop. In addition, two galvanized metal pipes were observed protruding from the concrete adjacent to a brick wall approximately 10 feet from the circular vaults. These features resemble fill ports and vent pipes, suggesting the presence of one or more USTs at this location.
- **Vehicle Maintenance Shop** – Historical documents suggest that the City has been using the City Lot for the maintenance and repair of vehicles and equipment since at least the 1960s. Used petroleum products, solvents, and other chemicals associated with maintenance and repair activities may have impacted surface soil, subsurface soil, and groundwater at the City Lot.
- **Buried Medical Wastes** – The current Water & Sewer Planning & Engineering Building was previously operated by the American Red Cross as the Savannah Regional Blood Center. Terracon was previously informed by site personnel that buried medical wastes were encountered during an excavation near the building a number of years ago. There is the potential for biologically hazardous waste to be encountered during future excavations of this area.
- **Former Paint Shop** – Terracon was previously informed by site personnel that the current Refuse Department building was formerly used as a paint shop for traffic signs and signals. Used paint and solvents associated with the paint shop may have impacted surface soil, subsurface soil, and groundwater at the City Lot.
- **Former Coal Pocket** – Historical use information suggests the presence of a coal storage yard adjacent to the west side of the former Boiler House (now part of the Vehicle Maintenance Shop). Stormwater runoff and leachate from the coal pile may have impacted surrounding soil and groundwater with heavy metals and petroleum hydrocarbons.
- **Former Fueling Station** – Historical use information suggests the presence of an aboveground fuel tank with an earthen berm and pump station in the west central portion of the City Lot (near the current location of the Water Distribution Department building). Historical spills associated with this fueling station may have impacted underlying soil and groundwater with petroleum hydrocarbons and lead.
- **Asbestos Containing Materials (ACMs)** – Historical records indicate that a majority of the buildings on the City Lot were constructed between 1892 and 1968. Therefore, a number of these buildings are likely to have ACMs.

4.2 Surrounding Properties

The following environmental concerns were noted for properties in the vicinity of the New Arena Site and Canal District based on the review of previous environmental assessment reports, historical use documents, environmental regulatory database information, and area reconnaissance. The AOCs identified for the surrounding properties are depicted on Figure 5.

- **Tenenbaum Property** – The Tenenbaum property is on the opposite (east) side of the Springfield Canal from the New Arena Site. Historical documents suggest that industrial operations were conducted on the property from sometime prior to 1916 until at least 1994. Historical industrial operations may have impacted soil and groundwater at the Tenenbaum property. The local topography suggests that the western portion of the Tenenbaum property is upgradient from the Springfield Canal and New Arena Site.
- **Stiles Avenue Property** – The Stiles Avenue Property adjoins the northern boundary of the New Arena Site. The City envisions a portion of this property to be developed into the New Canal Park. A Phase II ESA conducted in 2004 identified lead in the surface soil, subsurface soil, and groundwater at concentrations exceeding applicable regulatory standards. In addition, chromium was detected in the groundwater at a concentration exceeding the MCL. Following the Phase II ESA, a groundwater resampling event was conducted in December 2004. Metals were not detected at concentrations exceeding MCLs in the groundwater samples collected during the resampling event. The local topography suggests that the Stiles Avenue Property is downgradient from the New Arena Site.
- **Norfolk Southern Property** – The Norfolk Southern Property is located across Stiles Avenue and approximately 100 feet northwest from the New Arena Site. The City envisions a portion of this property to be developed into the New Canal Park. A Phase I ESA in September 2006 identified areas of stressed vegetation and evidence of buried debris. A Phase II ESA was not completed for the Norfolk Southern Property.
- **Louisville Road Property** – The Louisville Road property is approximately 900 feet northwest from the New Arena Site. The City envisions a portion of this property to be developed into the New Gateway Park. Historical photographs show several rail sidings and numerous piles of materials on the property between 1951 and 1994. A Phase II ESA conducted in 2004 identified a large amount buried trash and debris on the Louisville Road Property. However, no parameters were detected in the soil or groundwater at concentrations exceeding applicable regulatory criteria.
- **CSXT Property on Feeley Avenue** – The CSXT Property on Feeley Avenue is listed on the Georgia EPD HSI under Site Number 10905 due to a known release of arsenic in soil and groundwater at levels exceeding the reportable quantity. The CSXT property is on the opposite (west) side of Stiles Avenue from the New Arena Site. The local topography suggests that the CSXT property is upgradient from the New Arena Site. Documents

obtained from the Georgia EPD indicate that CSXT has recently achieved compliance with the Rules of Hazardous Site Response for groundwater and soil at the property. The property will be eligible for removal from the HSI once the Georgia EPD Director certifies groundwater compliance with RRSs and a Uniform Environmental Covenant is executed prohibiting residential use.

- **Sheppard Pojos (Citgo Gas Station) Site** – The Sheppard Pojos Site is located on the southwest corner of the intersection of West Gwinnett Street and Stiles Avenue, approximately 100 feet west from the southwest corner of the New Arena Site. Regulatory database information indicates that the Sheppard Pojos Site is an active LUST site. A remediation system and monitoring wells can also be seen on the site. Documents obtained from the Georgia EPD indicate that a MPE system operated at the Sheppard Pojos Site until April 2014. A potentiometric surface map for the site show a general groundwater flow direction to the southeast (towards the City Lot) prior to the installation of the MPE system. Groundwater quality maps indicate that the benzene groundwater plume has not been delineated along the southeast corner of the Sheppard Pojos Site.
- **Jackson Brothers Service Center (El Cheapo Gas Station) Site** – The Jackson Brothers Site is located on the southeast corner of the intersection of West Gwinnett Street and Stiles Avenue, approximately 100 feet south from the southwest corner of the New Arena. Regulatory database information indicates that the Jackson Brothers Site is an active LUST site. A remediation system and monitoring wells can also be seen on the site. Documents obtained from the Georgia EPD indicate the Jackson Brothers monitoring well network includes three wells (MW-19, MW-20, and MW-21) in the southwest corner of the City Lot. Historically, benzene has been detected in wells MW-19 and MW-21 at concentrations exceeding the Georgia EPD RRS of 0.005 mg/L. Potentiometric surface maps indicate that groundwater at the Jackson Brothers Site generally flows to the southeast, away from the City Lot.
- **Savannah Wood Preserving Company, Inc.** – The Savannah Wood site is an active wood preserve manufacturing facility located approximately 200 feet west of the New Arena Site. Regulatory database information indicates that a spill of CCA was reported at the site on June 19, 2000. The SPILLS database information indicates that no waterways were impacted by the release. The local topography suggests that the Savannah Wood site is upgradient from the New Arena Site.
- **Movsovit of Georgia Facility** – The Movsovit site is a manufacturing facility located approximately 100 feet west of the New Arena Site. Regulatory database information indicates that the Movsovit site is listed on the LUST and SPILLS databases. According to the LUST database, two UST releases have been reported at the facility. Both LUST cases have been issued NFA status. The SPILLS database indicates that a release of diesel fuel occurred at the site and impacted the canal. No further information was given concerning the diesel spill. The local topography suggests that the Movsovit site is upgradient from the New Arena Site.

- **Former Oglethorpe Charter School Site** – The City envisions developing the Savannah Waterworks at the former location of the Oglethorpe Charter School. The Sheppard Pojos Site is directly adjacent to the southeast corner of the Former Oglethorpe Charter School site.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

Based on the findings of this environmental review, Terracon is able to provide the following answers to the basic environmental background questions for the New Arena Site and surrounding properties:

- The target tracts have not been adequately investigated. This environmental review identified eight (8) AOCs at the City Lot that are in need of further investigation.
- Contamination has been previously identified at four (4) properties directly adjacent to the target tracts: Sheppard Pojos Site (southwest), Jackson Brothers Site (south), CSXT Property on Freely Avenue (west), and the Stiles Avenue Property (north).
- COCs include petroleum hydrocarbon compounds and heavy metals.
- Historical industrial operations may have impacted soil and groundwater on the adjacent Tenenbaum Property. Contaminated groundwater on the Tenenbaum Property would have the potential to impact the Springfield Canal and New Arena Site.
- The current condition and geographic extent of the existing plume on the Stiles Avenue Property is unknown. Previous site assessments for the property did not fully delineate the extent of contamination. A review of Georgia EPD files was completed to determine the current condition and extent of groundwater plumes for the Sheppard Pojos Site, Jackson Brothers Site, and CSXT Property on Feeley Avenue. Groundwater quality and isoconcentration maps for the Sheppard Pojos Site suggest that benzene groundwater impacts have not been delineated in the southeast corner of the property. Groundwater quality and isoconcentration maps for the Jackson Brothers Site show a benzene plume extending onto the southwest corner of the City Lot. Documents reviewed for the CSXT Property on Feeley Avenue indicate that historical detections of arsenic in groundwater at concentrations exceeding the NC were the likely the result of suspended sediments in the samples. Recent analytical data does not indicate the presence of an arsenic plume in the groundwater at the CSXT property.
- Source materials do exist on adjacent contaminated sites. There are no indications of remediation activities having occurred on the Stiles Avenue Property. Remediation systems have been installed at the Jackson Brothers Site and Sheppard Pojos Site. The

site plan for the Sheppard Pojos Site shows the installation of an MPE system around the perimeter of the USTs and fuel dispensers. However, documents suggest that the system was deactivated in April 2014 at the request of the EPD. Recent documents also show the presence of free product in several wells at the Sheppard Pojos Site. The site plan for the Jackson Brothers Site shows the installation of extraction wells around the perimeter of the service center. Historical documents show free product in several wells in October 2003, however it is unclear from recent documents if free product remains at the site. Source materials are not likely to exist on the CSXT Property on Feeley Avenue, as approximately 8,628 tons of impacted soil were excavated and removed from the property in August and September 2014. In addition, no constituents were detected at concentrations exceeding Type 1 RRS during two recent groundwater sampling events at the CSXT property. The CSXT Property on Feeley Avenue is likely to be removed from the HSI once the Director of the Georgia EPD concurs with the certificate of compliance for groundwater and the execution of a Uniform Environmental Covenant prohibiting residential use.

Based on the environmental background information obtained for the target tracts and surrounding properties, Terracon is able to provide the following answers to the environmental engineering questions for the City of Savannah Arena project:

- The Springfield Canal is likely to act as a groundwater divide that would prevent the migration of potential contaminants to the New Arena Site. However, further study is necessary to confirm that the canal functions as a groundwater divide between the two properties.
- Previous site assessments conducted by Terracon on adjacent properties did not sample surface water within the Springfield Canal. Further study is necessary to determine if the canal is currently contaminated by the migration of contaminants through the surficial aquifer.
- This environmental review did not identify specific information concerning the current groundwater quality of the Springfield Canal. Previous site assessments have identified groundwater contaminants on properties adjacent to the canal (Stiles Ave Property). Further study is necessary to determine the current and future groundwater quality of the canal.
- Proposed utility lines installed within or adjacent to areas of groundwater contamination on the target tracts and/or surrounding properties are likely to serve as preferential pathways for contaminant migration. Further study of proposed utility line routes is necessary to prevent the creation of preferential pathways for the migration of groundwater contaminants.
- The depth of the saturated zone is generally shallow and varies throughout the target tracts and surrounding properties. In addition, previous site assessments have identified wetland areas on the Stiles Avenue and Louisville Road Properties. Pondered surface water

is also visible in historical aerial photographs of the LaFarge Site and Tenenbaum Property. Surface water and groundwater is likely to be encountered during the construction of the arena and associated structures. Further study is necessary to identify wetland and shallow groundwater areas on the target tracts and surrounding properties.

- Dewatering activities are likely to be necessary for construction of the arena and other associated structures. Dewatering within or adjacent to areas of contaminated groundwater has the potential to cause or speed up the migration of contaminants into non-or less-impacted areas. Further study is necessary to determine the potential effects of dewatering in areas near groundwater contamination.
- Contaminated groundwater withdrawn from the surficial aquifer during dewatering operations would need to be stored and disposed of in accordance with local, state, and federal regulations. The measures and costs associated with the handling, treatment, and disposal of contaminated groundwater depends upon the type of contaminants, level of contamination, and volume of contaminated groundwater to be extracted during dewatering activities. Further study is necessary to determine if the nature and extent of groundwater contamination in areas that requiring dewatering for construction.
- Long-term extraction and disposal of contaminated groundwater may be necessary depending on the nature and extent of groundwater contamination on the target tracts and surrounding properties to be developed as part of the City of Savannah Arena project. Further study is necessary to determine the nature and extent of groundwater contamination on the target tracts and surrounding properties.
- Long-term groundwater monitoring and / or remediation may be necessary depending on the nature and extent of groundwater contamination on the target tracts and surrounding properties to be developed as part of the City of Savannah Arena project. Further study is necessary to determine the nature and extent of groundwater contamination on the target tracts and surrounding properties.
- Contaminant barrier walls may be necessary to prevent the migration of groundwater contamination from adjacent properties. Further study is necessary to determine if there is potential for the migration of groundwater contaminants from adjacent properties to the New Arena Site or surrounding Canal District properties.
- Pervious surface improvements in certain areas may enhance recharge and increase groundwater contaminant migration in the surficial aquifer. Further study is necessary to determine the nature and extent of groundwater contamination on the target tracts and surrounding properties.

5.2 Recommendations

5.2.1 Target Tracts

A site reconnaissance and review of previous environmental assessment reports, historical use documents, and environmental regulatory database information indicates that there are environmental concerns on the target tracts that have not been adequately investigated. In addition, there are adjacent properties with groundwater contamination that may have impacted the target tracts. Therefore, the following actions are recommended for the target tracts:

- **On-Site AOCs** – A limited site investigation (LSI) is recommended to evaluate surface soil, subsurface soil, and groundwater conditions in the vicinity of the following AOCs identified on the target tracts by this environmental review:
 - Fueling Station and USTs
 - Monitoring Wells
 - Suspected UST(s)
 - Vehicle Maintenance Shop
 - Buried Medical Wastes
 - Former Paint Shop
 - Former Coal Pocket
 - Former Fueling Station
- **Adjacent Properties** – It is recommended that the LSI include an evaluation of soil, subsurface soil, and groundwater conditions along the boundaries between the New Arena Site and the following adjacent properties with known or suspected groundwater contamination:
 - Sheppard Pojos (Citgo Gas Station) Site
 - Jackson Brothers Service Center (El Cheapo Gas Station) Site
 - Tenenbaum Property
 - Stiles Avenue Property
- **Springfield Canal** – It is recommended that the LSI include an assessment of the surface water and groundwater conditions of the Springfield Canal adjacent to the New Arena Site. In addition, the LSI should include an evaluation of the hydrogeologic characteristics of the canal to determine if it acts as an effective groundwater barrier that would prevent potential migration of contaminants to the New Arena Site.

- **Wetlands** – It is recommended that jurisdictional wetland delineation study be completed for the New Arena Site.
- **ACMs** – It is recommended that an asbestos survey be completed by a certified asbestos inspector in accordance with the NESHAP and the AHERA requirements prior to the demolition or renovation of any structures on the City Lot.

5.2.2 Surrounding Properties

A review of previous site assessments, historical documents and environmental regulatory database information indicates that there are environmental concerns on surrounding properties owned by the City that are included in the Canal District development plan. In addition, there are adjacent properties with groundwater contamination that may have impacted these properties. Therefore, the following actions are recommended for the surrounding properties:

- **Stiles Avenue Property** – Conduct an LSI to determine the nature and extent of lead and chromium impacts previously identified lead in the surface soil, subsurface soil, and groundwater at the site. The LSI should also include an evaluation of groundwater conditions along the boundary with the Tenenbaum property. An updated jurisdictional wetland delineation study is also recommended for the Stiles Avenue Property.
- **Norfolk Southern Property** – Conduct an LSI to evaluate surface and subsurface conditions in areas of stressed vegetation. In addition, the LSI should include a subsurface investigation to determine the horizontal and vertical extent of buried debris previously identified at the site.
- **Louisville Road Property** – Conduct an LSI to determine the horizontal and vertical extent of buried debris previously identified at the site. An updated jurisdictional wetland delineation study is also recommended for the Louisville Road Property.
- **Former Oglethorpe Charter School Site** – It is recommended that the City conduct an LSI to determine if the UST release at the Sheppard Pojos Site has impacted groundwater or soil vapor conditions at the site.

APPENDIX G:
STORMWATER
MANAGEMENT
APPROACH

Technical Memorandum



To: Kevin Smith, PE, CFM Thomas & Hutton
CC: Jimmy Collins, PE Thomas & Hutton
From: Courtney Reich, AICP, CFM, Ecological Planning Group, LLC
Date: February 11, 2016
RE: Green Infrastructure Approach for the Proposed Savannah Arena Site

1 GREEN INFRASTRUCTURE STORMWATER MANAGEMENT APPROACH

Green Infrastructure (GI) is a concept that is based upon restoring pre-development hydrology on development and redevelopment sites, primarily through practices that encourage infiltration and/or evapotranspiration of stormwater runoff. However, on certain sites infiltration may not be practical or recommended. In those cases, GI practices may include practices that reduce the **volume** of stormwater runoff as well as reducing runoff rates, thereby mimicking the natural hydrology of the site to the maximum extent practicable.

The following memorandum provides the regulatory basis and recommendations for implementation of a GI approach to post construction stormwater runoff management on the proposed City of Savannah Arena site. It includes a description of applicable site conditions, discussion of the regulatory requirements the City must observe, and recommendations for specific GI practices.

2 SITE CONSIDERATIONS

Preliminary analysis of the proposed Arena site indicates that the following conditions exist and must be considered when developing the Stormwater Management Concept Plan for this redevelopment project:

- **Groundwater Contamination:** There are several accounts of recent and historic groundwater contamination on the subject property and neighboring properties which may or may not impact the subject property. While a detailed subsurface soil assessment has not been completed as part of this project, it is reasonable to conclude that contaminated soils likely exist in association with the groundwater contamination on site.
- **High Water Table:** Due to the low ground surface elevations associated with the property, it is likely that the water table is relatively close to the surface on the subject property.
- **Floodplain:** Again, due to the low elevations on this site, parts of the subject property may be at or below the current Base Flood Elevation (BFE).
- **Limited Openspace:** Due to the size constraints of the subject property, there will be little area available for traditional stormwater best management practices (BMPs), such as detention ponds.

3 REGULATORY REQUIREMENTS

The City of Savannah has been designated by the Georgia Environmental Protection Division (EPD) and the US Environmental Protection Agency (EPA) as a Phase I community because of its classification by the US Census as an “urbanized” area and is subject to the requirements of the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Phase I Permit. This permit, most recently re-issued in 2012, requires that the City regulate post construction stormwater runoff from new development and redevelopment projects. The City’s NPDES Phase I MS4 permit requires that the City adopt the Coastal Stormwater Supplement (CSS) to the Georgia Stormwater Management Manual (GSMM) as its technical guide for stormwater site design. Furthermore, the permit also “strongly encourages” the use of Green Infrastructure (GI) and Low Impact Development (LID) techniques through the following provision:

“The permittee must have a program in place for considering the use of GI/LID practices and developing an inventory of these practices.” This program must include GI/LID Practices such as green roofs, permeable pavement, vegetated filter strips, and rain gardens.

3.1 City of Savannah Local Design Manual Requirements

Per the requirements of the NPDES Phase I MS4 Permit, the City of Savannah updated its Stormwater Management Ordinance and Local Design Manual (LDM) to include the stormwater site design criteria specified in the CSS, and they are outlined below:

2.2 Use of Green Infrastructure Practices

Green Infrastructure/Low Impact Development (GI/LID) practices shall be used to the maximum extent practical during the creation of a stormwater management concept plan for a proposed development project. Green infrastructure practices can be used to not only help protect local terrestrial and aquatic resources from the direct impacts of the land development process, but also to help maintain pre-development site hydrology and reduce post-construction stormwater runoff rates, volumes and pollutant loads. ...All GI/LID practices shall be selected, designed, constructed, and maintained in general accordance with the information presented in the latest edition of the CSS to the GSMM and the LDM.

2.3 Stormwater Runoff Reduction

2.3.1 Development Criteria

The stormwater runoff volume generated by the first 1.2” of rainfall is called the runoff reduction storm event (RRv), in Section 4.4.1 of the latest edition of the CSS to the GSMM. The RRv shall be captured on-site. A stormwater management system is presumed to comply with these criteria if, according to the following criteria:

- 1) It includes green infrastructure practices that provide for the interception, evapotranspiration, infiltration or capture and reuse of stormwater runoff, that have been selected, designed, constructed and maintained in accordance with the information presented in the latest edition of the CSS to the GSMM and the LDM; and,
- 2) It is designed to provide the amount of stormwater runoff reduction specified in the latest edition of the CSS to the GSMM.

It is important to note that the City of Savannah has anticipated the difficulty of implementing this particular criteria on certain sites, including sites that contain one or more of the following conditions: high groundwater, impermeable soils, contaminated soils or confined groundwater aquifer recharge areas. Therefore, the LDM includes a provision that allows the Stormwater Director to reduce the amount of stormwater runoff reduction needed on site, so long as the applicant has provided documentation that they have utilized GI/LID practices on site to the maximum extent practicable. However, it should be noted that whatever part of the first 1.2" of rainfall that cannot be infiltrated must be treated through water quality BMPs identified in the CSS and GSMM, per the requirements of Section 2.4: Stormwater Quality Management and Protection.

4 RECOMMENDED GREEN INFRASTRUCTURE BEST MANAGEMENT PRACTICES

The following GI Practices are recommended for consideration on the proposed Arena site. These practices are likely the most appropriate GI practices available for the anticipated site conditions and the limitations they will likely impose. Furthermore, these practices are specifically recommended by the CSS to the GSMM, and will allow the proposed Arena project to better meet the requirements of the City's Stormwater Management Ordinance and LDM, when combined with more traditional stormwater management practices. The following section includes: 1) a description of recommended Best Management Practice (BMP) from the CSS/GSMM, 2) a summary of how those BMPs meet the Stormwater Management Criteria required by the City's Stormwater Management Ordinance and NPDES Phase I MS4 Permit, and 3) site considerations during BMP selection and design.

4.1 GREEN INFRASTRUCTURE BMPs

Parking Lot Landscape Areas:

The inclusion of landscaping islands and buffer strips throughout the parking lot will reduce the amount of new impervious cover. In many cases, these landscaping areas can be designed to function as LID practices, such as bioretention areas (see below) that can be used to treat stormwater runoff from other parts of the development site.

Key Considerations for Parking Lot Landscape Areas from the CSS/GSMM:

- Minimizes the creation of new impervious cover on development sites
- Maintains pre-development site hydrology by reducing post-construction stormwater runoff rates, volumes and pollutant loads
- Provides shade for parked cars and improve parking lot aesthetics
- Treats stormwater runoff generated elsewhere on the development site

Green Roofs:

Green roofs typically consist of underlying waterproofing and drainage materials and an overlying engineered growing media that is designed to support plant growth. Stormwater runoff is captured and temporarily stored in the engineered growing media, where it is treated through the processes of evaporation, transpiration, and root uptake before being conveyed back into the draining system. Green roofs can provide measurable reductions in post-construction stormwater runoff rates, volumes and pollutant loads from development sites.

Key Considerations for Green Roofs from the CSS/GSMM:

- Reduces post-construction stormwater runoff rates, volumes and pollutant loads without consuming valuable land.
- Particularly well suited for use on urban development and redevelopment sites.
- Can provide for stormwater runoff volume reduction on sites where infiltration is not possible or not recommended.
- Can be difficult to establish vegetation in the harsh growing conditions found on rooftops in coastal Georgia or on rooftops with slopes of 10% or greater.

Permeable Pavement with Underdrain:

A permeable pavement system allows stormwater runoff to infiltrate through the pavement surface into an underlying stone reservoir, where it is temporarily stored and conveyed back into the storm drain system through an underdrain system. Permeable pavements represent an alternative to traditional impervious paving surfaces that provide for storage and reduce the post-construction rate, volume, and pollutant loading of stormwater runoff. In this particular application, it may be recommended to include an impermeable lining below the underdrain to prevent infiltration into potentially contaminated soils and/or groundwater.

Key Considerations for Parking Lot Landscape Areas from the CSS/GSMM:

- Provides for stormwater runoff treatment without sacrificing parking area to BMP facilities.
- Appropriate for use in low traffic areas, such as overflow parking lots
- Construction costs can be relatively high, which can be offset by savings on stormwater infrastructure and increased areas available for parking.

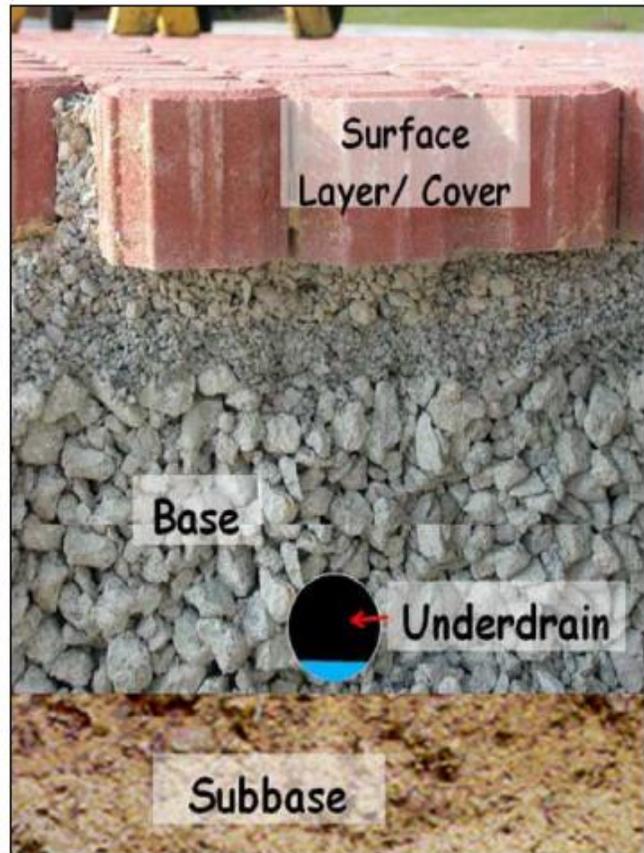


Figure 7.28: Components of a Permeable Pavement System
(Source: Hunt and Collins, 2008)

Stormwater Planters

Stormwater planters are landscape planter boxes equipped with waterproof liners, filled with an engineered soil mix, planted with trees, shrubs and other herbaceous vegetation. They are designed to receive stormwater runoff as part of a larger stormwater drainage system. Stormwater planters capture and temporarily store stormwater runoff in the engineered soil mix, where it is treated through the processes of evaporation, transpiration, and root uptake before being conveyed back into the storm drain system through an underdrain. Stormwater planters can provide measurable reductions in post-construction stormwater runoff rates, volumes and pollutant loads.

Stormwater planters are typically used on commercial development and institutional sites and, because they can be constructed immediately adjacent to buildings and other structures, they are ideal for use in urban areas with little available land for traditional stormwater treatment practices. Although they are often designed to receive rooftop runoff, they can also be used to treat stormwater runoff from other impervious areas, such as sidewalks, plazas and parking lots.

Key Considerations for Stormwater Planters from the CSS/GSMM:

- Helps restore pre-development hydrology on development sites and reduces post-construction stormwater runoff rates, volumes and pollutant loads.
- Can be integrated into development plans as attractive landscaping features.
- Particularly well suited for use on urban development sites.

Rainwater Harvesting

Rainwater harvesting practices (i.e. cisterns) have been used for millennia to intercept, divert and store rain for later use. In a typical rainwater harvesting system, rainfall is collected from a gutter and downspout system, filtered, and conveyed into a storage tank. Once captured in the storage tank, it may be used for non-potable indoor or outdoor uses. If properly designed, rainwater harvesting systems can significantly reduce post-construction stormwater runoff rates, volumes and pollutant loads on development sites. Rainwater harvesting also helps reduce the demand on public water supplies, which, in turn, would also help the City of Savannah meet water withdrawal reduction goals.

The CSS states that rainwater harvesting is well suited to municipal buildings on urban redevelopment sites. Although rainwater harvesting system can sometimes be expensive to install, rainwater harvesting systems are often an important component of “green buildings,” in particular those that are hoping to achieve certification in the Leadership in Energy and Environmental Design (LEED) Green Building Rating System.

Key Considerations for Rainwater Harvesting from the CSS/GSMM:

- Reduces post-construction stormwater runoff rates, volumes and pollutant loads
- Are particularly suited to development sites such as the proposed Arena site
- Reduces demand on public water supplies
- Stored rainwater must be used on a regular basis to maintain system storage capacity

Bioretention Areas, with Underdrain

Bioretention areas are shallow depressed areas that are filled with an engineered soil mix and are planted with trees, shrubs and other herbaceous vegetation. They are designed to capture and temporarily store stormwater runoff in the engineered soil mix, where it is subjected to the hydrologic processes of evaporation and transpiration, before being conveyed back into the storm drain system through an underdrain. This allows them to provide measurable reductions in post-construction stormwater runoff rates, volumes and pollutant loads on development sites. On the proposed Arena site, it may be recommended to include an impermeable lining below the underdrain to prevent infiltration into potentially contaminated soils and/or groundwater.

Key Considerations for Bioretention Areas from the GSMM:

- Helps restore pre-development hydrology on development sites and reduces post-construction stormwater runoff rates, volumes and pollutant loads.
- Can be integrated into development plans as attractive landscaping features.
- Can only be used to treat runoff from relatively small drainage areas of 5 acres in size or less.

4.2 RECOMMENDED BMPs AND THE CITY OF SAVANNAH STORMWATER MANAGEMENT CRITERIA

The CSS/GSMM provides a very helpful method for site designers to evaluate how each of the GI practices can be used to help satisfy the City's post-construction stormwater management criteria that apply to a development site. The matrix on the following pages shows the results of this assessment, and how each of the recommended BMPs above satisfy the various criteria.

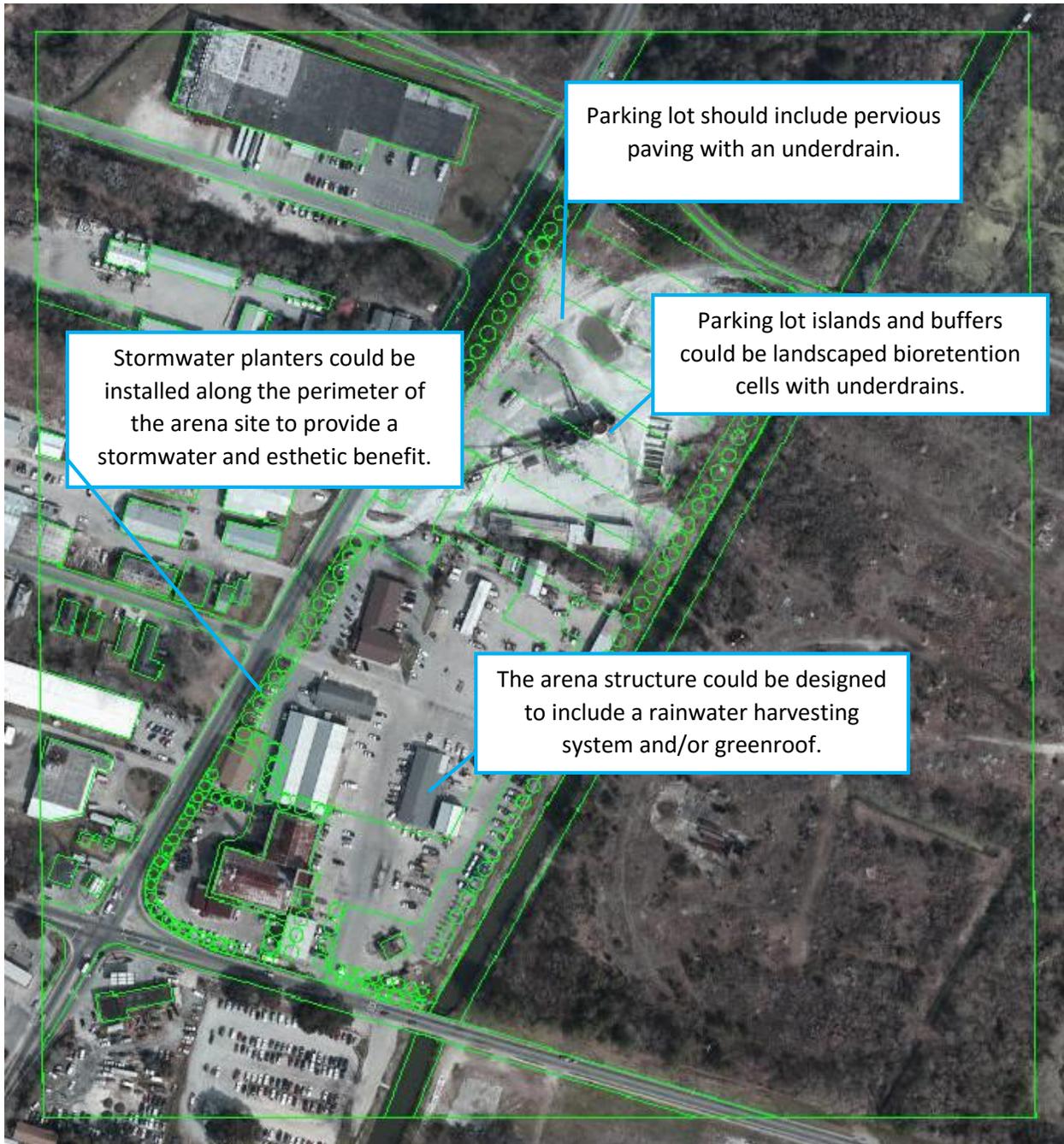
GREEN INFRASTRUCTURE PRACTICE	STORMWATER RUNOFF REDUCTION	WATER QUALITY PROTECTION	AQUATIC RESOURCE PROTECTION	OVERBANK FLOOD PROTECTION	EXTREME FLOOD PROTECTION
Create Landscaping Areas in Parking Lots	Minimizing the creation of new impervious cover results in a lower volumetric runoff coefficient (Rv) and, consequently, a lower runoff reduction volume (RRv) on a development site.	Minimizing the creation of new impervious cover results in a lower volumetric runoff coefficient (Rv) and, consequently, a lower runoff reduction volume (RRv) on a development site.	Minimizing the creation of new impervious cover results in a lower runoff curve number (CN) and, consequently, a lower aquatic resource protection volume (ARV), a lower overbank peak discharge (Qp25), and a lower extreme peak discharge (Qp100) on a development site.		
Green Roofs	Reduce the runoff reduction volume (RRv) conveyed through a greenroof by 60%	Reduce the runoff reduction volume (RRv) conveyed through a greenroof by 60%	Proportionally adjust the post-development runoff curve number (CN) to account for the runoff reduction provided this BMP calculating the aquatic resource protection volume (ARV) on a development site.	Proportionally adjust the post-development runoff curve number (CN) to account for the runoff reduction provided by this BMP when calculating the overbank peak discharge (Qp25) on a development site.	Proportionally adjust the post-development runoff curve number (CN) to account for the runoff reduction provided by this BMP when calculating the extreme peak discharge (Qp100) on a development site.
Permeable Pavement with Underdrain	Subtract 50% of the storage volume provided by a permeable pavement system with underdrain from the runoff reduction volume (RRv) conveyed through the system.	Subtract 50% of the storage volume provided by a permeable pavement system with underdrain from the runoff reduction volume (RRv) conveyed through the system.			

GREEN INFRASTRUCTURE PRACTICE	STORMWATER RUNOFF REDUCTION	WATER QUALITY PROTECTION	AQUATIC RESOURCE PROTECTION	OVERBANK FLOOD PROTECTION	EXTREME FLOOD PROTECTION
Stormwater Planters	Subtract 50% of the storage volume provided by a stormwater planter from the runoff reduction volume (RRv) conveyed through the stormwater planter.	Subtract 50% of the storage volume provided by a stormwater planter from the runoff reduction volume (RRv) conveyed through the stormwater planter.	Proportionally adjust the post- development runoff curve number (CN) to account for the runoff reduction provided by this BMP when calculating the aquatic resource protection volume (ARV) on a development site.	Proportionally adjust the post- development runoff curve number (CN) to account for the runoff reduction provided by this BMP when calculating the overbank peak discharge (Qp25) on a development site.	Proportionally adjust the post- development runoff curve number (CN) to account for the runoff reduction provided by this BMP when calculating the extreme peak discharge (Qp100) on a development site.
Rainwater Harvesting	Subtract 75% of the storage volume provided by a rainwater harvesting system from the runoff reduction volume (RRv) captured by the system.	Subtract 75% of the storage volume provided by a rainwater harvesting system from the runoff reduction volume (RRv) captured by the system.			
Bioretention Areas, with Underdrain	Subtract 50% of the storage volume provided by a bioretention area with underdrain from the runoff reduction volume (RRv) conveyed through the bioretention area.	Subtract 50% of the storage volume provided by a bioretention area with underdrain from the runoff reduction volume (RRv) conveyed through the bioretention area.			



4.3 SITE DESIGN RECOMMENDATIONS

Based on the preliminary site plan recommendations for the Arena site, EPG recommends that the following GI/LID BMPs be considered for inclusion in the final site design and stormwater management plan, as shown in the figure below, and in order to comply with the City's Stormwater Management Ordinance, LDM and NPDES Phase I MS4 Permit.



The following table provides a summary of design recommendations from the CSS/GSMM related to the recommended BMPs. The criteria included in the summary are as follows:

- **Drainage Area:** This criteria describes the maximum contributing drainage area each BMP can realistically handle and treat effectively.
- **Area Required:** This criteria indicates how much area the BMP will likely occupy on a development or redevelopment site.
- **Slope:** This criteria describes the maximum or minimum slope on which the GI practice can be installed.
- **Minimum Head:** This criteria provides an estimate of the desired amount of elevation difference needed within the BMP, from the inflow to the outflow, to allow for gravity operation.
- **Minimum Depth to Water Table:** This criteria gives the desired minimum distance that should be provided between the bottom of the GI practice and the top of the seasonal high groundwater table.
- **Soils:** This column describes the influence that the underlying soils (i.e., hydrologic soil groups) can have on the performance of the GI practice.

GREEN INFRASTRUCTURE PRACTICE	DRAINAGE AREA	AREA REQUIRED	SLOPE	MINIMUM HEAD	MINIMUM DEPTH TO WATER TABLE	SOILS
Green Roofs	N/A	No Restriction	20% max, 10% or less is a plus	6 to 12 inches	N/A	Use appropriate engineered growing media
Permeable Pavement with Underdrain	N/A	No Restriction	6%	2 to 4 feet	2 feet	Should drain within 48 hours of end of rainfall event.
Stormwater Planters	2,500 sq ft; max. length of flow path 75 to 150 feet long	5% of contributing drainage area	6%	30 to 36 inches	2 feet ¹	Should drain within 24 hours of end of rainfall event.
Rainwater Harvesting	No Restrictions	Varies	No restrictions	N/A	N/A	N/A
Bioretention Areas, with Underdrain	5 acres	5% to 10% of contributing drainage area	6%	42 to 48 inches ¹	2 feet	Should drain within 48 hours of end of rainfall event

¹Criteria may be relaxed on development sites that have a shallow water table.



APPENDIX H: ARENA WATER & SEWER

Savannah Arena Water & Sewer

Water

- ADF approximately 26,472 gpd and Peak flow 105,887 gpd based on programming and square footages provided
- Required fire flow 2,250 gpm for 4 hour duration per IFC 2012 based on 149,300 SF Type IIA construction type (fire separation between floors) and a 50% reduction for an approved automatic sprinkler system
- City Wells 2, 3, and 4 are within close proximity of the proposed arena site with Well 4 being a large capacity well.
- The site is surrounded by a 16-inch main on Gwinnet and a parallel 16-inch and 8-inch on Stiles. Typically the City's 16-inch mains are capable of 2,000 plus gpm fire flows at 20 psi, especially in close proximity to this number of wells.
- A fire protection booster pump may be required within the building to meet the high pressure needs of an automatic sprinkler system

Wastewater

- Anticipated Peak Sewage flow is approximately 74 gpm.
- City Lift Station No. 77 resides on the arena site and conveys sewage via an 8-inch force main across Springfield Canal and to an 8-inch/10-inch/12-inch sewers (it steps up from 8 to eventually 12-inch over a short distance) to a large 30-inch interceptor sewer that continues to Lift Station No. 23 (one of the City's largest stations).
- Lift Station pump, electrical, and control upgrades may be required to meet the additional pump capacity needs. The force main may also need to be relocated with an improved jack/bore or directional drill crossing of Springfield Canal.
- The 30-inch sewer and Lift Station 23 should have ample capacity for the additional 74 gpm.

Savannah Arena Development - February 2016

Overall Water/Sewer Loadings by Use

Planned Use	Total Square Footage	Total Suites	Total Seats or Persons²	Sq Ft Unit Loading¹	Per Seat or Person Unit Loading¹	Average Daily Flow (GPD)	Peak Daily Flow (GPD)³	Peak Daily Flow (GPM)	Calculated ERUs⁴
Seating Bowl	44,719		8,800		1 gpd/seat	8,800	35,200	24.4	29.33
Suites	8,260	12		5 gpd/100 sq ft		413	1,652	1.1	1.38
Press Area	6,649			15 gpd/200 sq ft		499	1,995	1.4	1.66
Club Area	11,000		400		20 gpd/seat	8,000	32,000	22.2	26.67
Concourse	41,300								
Retail	33,040			3 gpd/100 sq ft		991	3,965	2.8	3.30
First Aid	6,195			30 gpd/200 sq ft		929	3,717	2.6	3.10
Guest Services	2,065			15 gpd/200 sq ft		155	620	0.4	0.52
Specialty Food Court	5,060			5 gpd/100 sq ft		253	1,012	0.7	0.84
Bar	2,060		137		20 gpd/seat	2,747	10,987	7.6	9.16
Concessions	2,970			5 gpd/100 sq ft		149	594	0.4	0.50
Ticketing Lobby/Office	1,230			15 gpd/200 sq ft		92	369	0.3	0.31
East Retail/Resturant Shell Space	7,740			5 gpd/100 sq ft		387	1,548	1.1	1.29
Commissary	5,840			3 gpd/100 sq ft		175	701	0.5	0.58
Team Store	4,750			3 gpd/100 sq ft		143	570	0.4	0.48
Building Management/Offices	8,530			15 gpd/200 sq ft		640	2,559	1.8	2.13
Locker Rooms	10,750		60		35 gpd/person	2,100	8,400	5.8	7.00
Sub- Total SRD, LLC.						26,472	105,887	74	88

¹ Unit loadings based on City of Savannah 2015 Revenue Ordinance Water Use Standards (pg. 83-84), which provides flows in gallons per day for individual land use and customer descriptions.

² Total people based on estimated restaurant seats based on assumed occupancies of 20 SF/seat.

³ Peak Daily flows are based on peaking factors calculated using Recommended Standards for Wastewater Facilities ("10 States Standard"), Ratio of Peak Hourly Flow to Design Average Flow where Peak Factor = $18 + (\sqrt{P}) / 4 + (\sqrt{P})$. P is the population in thousands. Utilizing this calculation and the total estimated population of the service area the calculated peaking factor is 4.1. Therefore the maximum peaking factor of 4.0 is used to determine Peak Daily Flow.

⁴ Equivalent Residential Units (ERUs) are based on the typical City of Savannah 300 gpd per ERU calculation.

APPENDIX I:
SUMMARY OF
TRAFFIC ASSESSMENT

SAVANNAH ARENA

2016 TRAFFIC ASSESSMENT
SAVANNAH, GEORGIA

PREPARED FOR:
CITY OF SAVANNAH

J-25811

MARCH 2016



THOMAS & HUTTON

Prepared By

THOMAS & HUTTON

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1. INTRODUCTION

The new Savannah Arena is proposed on the east side of Stiles Avenue between Louisville Road and Gwinnett Street in Savannah. The site location (Exhibit 1T) and current Phase 1 development plan (Exhibit 2T) is attached in the appendix.

The proposed development would consist of an arena and a small area of complementing commercial use. The arena is currently planned to accommodate 7,600 seats for hockey, 8,400 seats for basketball, and 9,300 seats for boxing or concerts. Parking near the proposed arena is envisioned to consist of surface parking lots onsite, adjacent to Stiles Avenue, and adjacent to Gwinnett Street.

This traffic assessment is completed in an effort to give an overview of the surrounding traffic conditions, update previous studies, and assess the transportation needs associated with the current proposed arena development.

2. PREVIOUS STUDY

A Traffic Impact Study for the site was completed in 2014. The study assumed development of an 11,500 seat arena and 10,000 square feet of commercial space. The analysis also assumed that there would be a 1,600 space parking deck adjacent to the arena and two overflow parking lots with a total of 675 spaces on the corner of Gwinnett Street and Stiles Avenue. The current plan includes a slightly smaller arena with less parking in the immediate area.

The 2014 study noted that the City of Savannah was consulted on a number of the key assumptions, some of which are outlined below:

- Gwinnett Street will be widened to a four lane divided boulevard section, from Stiles Avenue to Interstate 16.
- A background growth rate of 1% per year is applied through 2044.
- Trips generated by the arena included the following assumptions
 - The arena is sold out (11,500 attendees); attendees average 3 persons per vehicle
 - There is 1 employee per 20 seats (575 employees); employees average 1.5 persons per vehicle
 - Of the attendees and employees, 90% use personal vehicles; 5% transit, 5% walk/bike
 - Of the attendees, 80% arrive within 1 hour of event; 80% depart within 1 hour of ending
 - Of the employees; all arrive more than 1 hour prior to the event; 80% depart within 1 hour of ending
 - Commercial uses are not anticipated to generate additional traffic within one hour of an event (trips to and from the commercial uses will be made by attendees or employees)

- The site generated trips were distributed in the following manner:
 - 72% to/from east on W. Gwinnett
 - 45% to/from I-16 south
 - 24% to/from areas to the east on Gwinnett
 - 3% to/from Boundary St
 - 9% West on Gwinnett
 - 8% to/from I-516
 - 1% to/from Gwinnett
 - 17% to/from north on Stiles
 - 5% to/from Augusta Avenue
 - 5% to/from E Lathrop
 - 4% to/from US 17 via Oglethorpe
 - 3% to/from the east on Oglethorpe
 - 2% to/from south on Stiles

Recommendations for improvements at multiple intersections were developed based on the analysis in the study.

Along Gwinnett Street, the following improvements were suggested as feasible options:

- At the I-516 off ramp intersection, install a roundabout or a signal with a NB right turn lane
- At the Stiles Avenue intersection, install additional turn lanes (above and beyond those anticipated as part of the Gwinnett widening) to include a EB right, WB dual left, NB left, and SB dual left
- At the I-16 on ramp intersection, install additional turn lanes (above and beyond those anticipated as part of the Gwinnett widening) to include a SB dual left and a EB free flow right
- At the I-16 off ramp intersection, install additional turn lanes (above and beyond those anticipated as part of the Gwinnett widening) to include a NB through/ left

Along Louisville Road, the following improvements were suggested as feasible options:

- At the Stiles Avenue intersection, install additional turn lanes to include a EB right
- At the US 17 off ramp intersection, install a roundabout or a signal
- At the W. Boundary Street intersection, install additional turn lanes to include a EB left

At the W. Oglethorpe and W. Boundary Street intersection, the following improvement was suggested:

- Install a multi lane roundabout or a signal

3. UPDATES TO PREVIOUS STUDY

Arena size

Current plans envision an arena with 7,600 seats for hockey, 8,400 seats for basketball and up to 9,300 seats for boxing or concerts. This represents a roughly 19% reduction from the assumption used in the 2014 study.

Trip Generation

The 2014 study assumed that the arena, when sold out, would generate 2,760 vehicle arriving trips during the peak hour before an event. Approximately 3,036 departing vehicle trips would be generated in the hour after the event.

Using the same trip generation assumptions as in the 2014 study (noted in section 2), the smaller arena (9,300 seats) could be expected to generate 2,232 arriving trips in the peak hour before the event and 2,455 departing trips in the hour after the event.

Parking

The 2014 study assumed that approximately 2,275 parking spaces would be available in the immediate vicinity of the arena, including structured parking. It was noted that 3,795 parking spaces would be desired, resulting in a shortfall of over 1,500 spaces.

The current plan envisions only surface parking, with a fewer number of spaces. The trip generation assumptions for those attending the event are assumed to be the same as the previous study; however, the employee assumptions are slightly different. The ratio of employees to seats is still assumed to be 1 employee for every 20 seats (465 employees). For the employees, it is assumed 80% use a personal vehicle with two persons per vehicle, while 13% utilizing public transit and 7% are walking/biking. Based on the assumptions outlined for the site there will be 2,790 spaces needed for attendees, and 186 spaces needed for employees, which requires a total of 2,976 parking spaces to support the site. Even with the reduced arena size, there will be a significant shortfall of parking spaces in the immediate area.

Trip Patterns

The 2014 study assumed a great majority of traffic would use the Gwinnett Street corridor to access the site. This corridor is proposed to be improved and can accommodate the traffic generated by the site with a few additional turn lanes. The reduction in size of the arena confirms this corridor when widened will have adequate capacity to accommodate the trips to and from the site.

One potential shift in trip distribution we see as feasible is more people will likely come from downtown via Stiles Avenue/Louisville Road due to the existing hotels and restaurants in the area that people may visit prior to an event. This could change the trip distribution to the following:

- 65% to/from east on W. Gwinnett
 - 43% to/from I-16 south
 - 20% to/from areas to the east on Gwinnett
 - 2% to/from Boundary St
- 7% West on Gwinnett
 - 6% to/from I-516
 - 1% to/from Gwinnett
- 26% to/from north on Stiles
 - 5% to/from Augusta Avenue
 - 5% to/from E Lathrop
 - 8% to/from US 17 via Oglethorpe
 - 8% to/from the east on Oglethorpe/Liberty
- 2% to/from south on Stiles

If drivers park in the downtown area of Savannah and are shuttled to the arena, some of the Gwinnett Street trips might shift to transit trips along the Louisville Road corridor. Without a parking garage and/or the appropriate number of surface parking spaces, some of the trip pattern assumptions may need to be modified. The lack of parking immediately surrounding the arena will force a greater number of attendees to walk or utilize transit.

Intersection Recommendations

Though detailed capacity analyses were not revised for the new arena size, some general observations can be made with regard to the 2014 recommendations.

The reduction in size of the arena from the 2014 assumptions is likely not significant enough to eliminate the need for the roadway improvements envisioned (outlined in section 2). Turn lane additions will likely be needed along Gwinnett Street at particular intersections to supplement the planned widening.

North of the arena site, the Louisville Road corridor may also require new signals and turn lane additions at particular intersections.

4. CORRIDORS

There are currently two main east/west entries for accessing the areas site, Louisville Road and Gwinnett Street. The Stiles avenue corridor connects these two entry accesses and is adjacent to the arena site. Exhibit 3T shows these corridors and their relationship to the Arena, I-16 and Downtown areas.

A. STILES AVENUE

Stiles Avenue will provide a main access to the arena area. As part of the arena area redevelopment, it is suggested that between Gwinnett Street and Louisville Road, Stiles Avenue be reconfigured to provide one lane in each direction with on street parking separated by a raised median. This configuration could be similar to the existing Oglethorpe or Liberty corridors downtown.

During periods when the arena is not in use, the outside lane could be utilized as a parking lane or an additional lane and on street parking could be added to the section if right-of-way allows. During events at the arena, the outside parking lane could be utilized as a bus only lane. The bus only lane could serve a higher number of transit riders, which may be necessary given the lack of parking in the immediate vicinity. Sidewalks and improved pedestrian accommodations should also be incorporated into the design. A typical roadway section has been included in the appendix (Exhibit 4T). The conceptual budget to complete these improvements would range from \$3-4 million plus right-of-way acquisition costs.

B. LOUISVILLE ROAD

Portions of Louisville Road include pavement sections wide enough to accommodate three lanes. The 2014 study suggested that a left turn lane be added to Louisville Road at the Boundary Street intersection. Since this recommendation would require widening a significant portion of the two lane

section, it is suggested that the remaining section of Louisville Road between Stiles Avenue and Boundary Street be widened to three lanes.

A three lane section would allow several potential options in regards to accommodating peak periods. Prior to an event, the center lane could be designated as a westbound lane or used as a dedicated bus/transit lane. If Stiles Avenue is a four lane section (and two lanes for receiving vehicles), dual left turn lanes for vehicles entering the arena area could be provided. After an event, the center lane could be reversed to provide an extra westbound lane for exiting vehicles or it could be used as a dedicated bus/transit lane for returning patrons to other parking areas downtown. A typical roadway section has been included in the appendix (Exhibit 4T). The conceptual budget to complete these improvements would range from \$1.25–1.75 million plus right-of-way acquisition costs.

Changing configurations such as this may require a significant police presence to direct traffic before and after events. Specific temporary lane configurations and turning patterns would need to be evaluated further; however, a widened Louisville Road could provide options and opportunities to accommodate very heavy traffic flows before and after events.

C. GWINNETT STREET

As mentioned in the previous study, Gwinnett Street is planned to be widened to a four lane divided facility in the near future. Several turn lane additions at particular intersections were recommended as part of that 2014 study. During the development of the project Federal Highway Administration questioned the need for the project and at that time the MPO changed the project to be more of a drainage and pedestrian improvement project. The City saw the need for the project and has proposed to move forward with the widening and a bridge replacement over the canal using local funds. A structured parking facility is also shown on the current Gwinnett Street concept plan on the City lot property. It would likely be a separate project to the Gwinnett Street Widening project. A typical roadway section has been included in the appendix (Exhibit 5T). If the Gwinnett Street widening project get underway prior to the arena construction then the turn lane and other improvements associated with the arena should be incorporated into the Gwinnett Street project. The conceptual budget to complete these improvements would range from \$4–5 million (excluding the parking structure) plus right-of-way acquisition costs.

5. SITE INGRESS/EGRESS

The current master plan envisions surface parking on the north side of the proposed arena adjacent to Stiles Avenue. Additional parking would be available on an existing City lot (future structure) on the south side of Gwinnett Street and a future lot on the northeast corner of Stiles Avenue and Gwinnett Street. Exhibit 6T showing these parking areas has been included in the appendix.

The main lot located north of the proposed arena should have an entrance off of Gwinnett Street. This access should align with the access to the City lot on the south side of Gwinnett Street and should provide right and left turn bays for entering vehicles. An

access at this location would require an access road running along the east side of the arena parallel to the Springfield Canal.

The main lot should also be served by two driveways along Stiles Avenue. If Stiles Avenue is configured as a median divided roadway, the northern most access should likely be placed at Feeley Avenue. An additional median break and parking lot access could be installed at Hoover St.

As detailed plans for the parking lot are being developed, it should be assumed that all entry points allow for two entering lanes prior to an event and two exit lanes after an event. Access points could be configured with enough width to accommodate 3 lanes at the approaches to Stiles Avenue or Gwinnett St. This would require that the access points be reconfigured during an event (with cones or flaggers) to accommodate the change in directional flow of traffic before and after an event.

This design of the parking lot and access points should be carefully planned in conjunction with the associated pedestrian network. Efforts should be made to separate the main pedestrian walkways from the main points of vehicular access.

Consideration should also be given to the determination of where and how parking fees are collected. If fees are to be charged, planning efforts should include evaluation of potential collection areas as well as the number of entry points. All collection points should be located well within the overall site and be adequately staffed to ensure queues do not extend on the main roadways.

A small loop road access adjacent to the arena is also planned on Stiles Avenue. Representatives from Chatham Area Transit (CAT) have requested a bus bay be incorporated into the site design for the arena. Their recommendation is the bay be as close to the arena building as practical and allow for the queuing of a minimum of three buses. CAT has also requested to the maximum extent practicable bus designated lanes be incorporated into the design of the adjacent roadways. Allowances should also be provided for private shuttles from hotels, restaurants, and bars in the downtown area.

6. CONSTRAINTS / OPPORTUNITIES

A. PARKING

Three parking lots are planned in the immediate area. The main lot is envisioned just north of the arena site adjacent to Stiles Avenue. This lot is planned to be roughly 5.2 acres, with space to accommodate approximately 390 vehicles. The City lot on the south side of Gwinnett Street is approximately 2.5 acres in size and could likely accommodate approximately 190 spaces. The Gwinnett Street improvement plan being developed by the City also has a future parking structure located in this location that would add parking to the site. On the northwest corner of Stiles Avenue and Gwinnett St, an additional 4.5 acre site could provide space for approximately 340 vehicles. There is an existing church parking lot located on the southwest corner of the Stiles/Gwinnett intersection that has been estimated to accommodate approximately 200 parking spaces.

As noted in section 3, the arena could generate the desire for close to 2,976 parking spaces during an event. With only 1120 available based on the current

plan, there is a deficit for the arena of 1,856 spaces. As plans develop, officials have three options to accommodate the required parking for the site:

- The first option is to acquire additional property in the vicinity or utilize other existing City property in the area to add more surface parking spaces. With a parking deficit of 1,856 spaces and a parking yield of approximately 75 spaces per acre, it would require approximately 25 acres of property to accommodate the needed spaces. The advantage for this option is the cost compared to a structured option. The biggest drawback to this option is the parking moves further from the arena and it could impact the redevelopment potential for the area with land taken up as parking.
- The second option would be to consider a structured parking garage to reduce the shortfall. If the existing onsite parking area were utilized for the garage it would likely take a 7-8 story structure to provide the appropriate number of spaces. The biggest advantage to this option is it is close to the arena and could provide a significant parking area for redevelopment. The biggest drawback to this option would likely be the cost.
- The final option would be utilization of other parking areas/structures downtown and an increased transit component to get patrons to the facility (Exhibit 7T). The biggest advantage to this option is it is the most cost effective because existing infrastructure is being utilized. The biggest drawback to this option is it would use parking for events that is needed for other downtown businesses.

B. CONNECTION TO AREAS EAST OF I-16

The I-16 exit ramp at MLK Jr. Blvd. and Montgomery Street has frequently been seen as a physical and psychological barrier to economic development, pedestrian activity, and neighborhood revitalization along the corridor.

Currently, the Coastal Region Metropolitan Planning Organization (CORE) is in the process of completing an Interchange Modification Report, which requires approval from the Federal Highway Administration (FHWA) and the Georgia Department of Transportation (GDOT) to remove the interchange. The removal of the interchange ramps is a multi-year process requiring detailed documentation to justify the removal followed by federal requirements for environmental analysis, design, and construction.

The Interchange Modification Report addresses the reconfiguration of the eastern terminus of I-16 at the Martin Luther King, Jr. (MLK) Blvd. and Montgomery St. interchange (exit #167). Re-configuring the interchange plans to include removal of the I-16 eastbound overpass over MLK Blvd. and adjacent ramps to allow for restoration of the surface street network to improve connectivity and mobility.

A Civic Master Plan (attached in the appendix-Exhibit 10T)) is being developed as part of the I-16 Ramp Removal Study. This Civic Master Plan calls for three connections under the existing Interstate. Cohen Street, Union Street, and Selma Blvd all show "future connections" to areas east of I-16.

As the ramp removal project and the arena project move forward, plans for each should be coordinated to evaluate the feasibility of extending one of these connections. An additional access to the arena via Cohen Street, Union Street, or Selma Blvd could help to disperse some of the site traffic and lessen the peak period burden on Gwinnett Street and Louisville Road/Stiles Avenue. Exhibit 3T in the appendix shows the Cohen Street connection to the Civic Master Plan. A typical roadway section has been included in the appendix (Exhibit 4T). The conceptual budget to complete these improvements would range from \$1.5–2 million plus right-of-way acquisition costs.

C. PEDESTRIAN AND TRANSIT CONNECTIONS

In the absence of increasing the parking supply immediately around the arena, some improvements to pedestrian and transit connections should be considered.

Consideration should also be given to providing shuttle or transit services between the arena and the existing parking structures in the vicinity. Evaluations should consider where attendees are likely to park and encourage use of ancillary lots. Planning efforts should assume the lots in the immediate area will fill up, and how and where arriving vehicles will be redirected when they do. If not anticipated, significant congestion can occur from vehicles circulating the area in search of parking.

A part of the CORE Civic Master Plan for the I-16 Exit Removal Project includes a revitalized area with a defined street and block plan, sidewalks, street trees, and other pedestrian oriented public spaces. The arena development offers an opportunity to extend this revitalization to the west side of I-16.

In addition, an extension of Cohen Street, Union Street, or Selma Blvd to the arena site could also provide another pedestrian corridor to the arena, or a transit route. Depending on where ancillary parking areas are located, this connection could provide a main gateway for pedestrians.

8. ASSESSMENT OF THE CURRENT CIVIC CENTER

The current Civic Center site, located between Liberty and Oglethorpe adjacent to Montgomery Street, will no longer be utilized in its current capacity. It has been recommended the Johnny Mercer theater portion of the facility be retained on the site. The existing arena and parking areas would then be available to be repurposed to the best and highest use for the area. Coordination with the City is needed to determine these future uses but two exhibits have been created to show potential options for the repurposing of the area. Exhibit 8T shows the re-establishment of the full street grid for the area and potential blocks for redevelopment along with re-establishment of a small portion of Elbert Square. Exhibit 9T shows re-establishment of West Perry Street and two larger parcels that could be redeveloped in the area. Absorption of this property back into the downtown fabric in a way that compliments the Johnny Mercer Theater would be the best alternative for the area.

9. SUMMARY / RECOMMENDATIONS

The new Savannah Arena is proposed on the east side of Stiles Avenue between Louisville Road and Gwinnett Street in Savannah. The proposed development would consist of an arena and a small area of complementing commercial use. The arena is currently planned to accommodate 7,600 seats for hockey, 8,400 seats for basketball and 9,300 seats for boxing or concerts.

A Traffic Impact Study for the site was completed in 2014 and recommended several roadway and access improvements. The study assumed a larger development than is currently envisioned. This current traffic assessment is summarized as follows:

With regard to the intersecting recommendations in the 2014 study, the following is noted:

- The roadway improvements recommended will still likely be needed to accommodate the current arena configuration

On the immediately surrounding roadways, consideration should be given to:

- Convert Stiles Avenue to a divided section with on-street parking at a minimum and ideally provide two lanes in each direction separated by a raised median with on-street parking.
- Widening the remaining section of Louisville Road between Stiles Avenue and Boundary Street to a three lane section
- City continue forward with widening Gwinnett Street to four lanes and incorporate turn lanes needed for the arena into the project.

Access to and from the main parking lot should include:

- One access on Gwinnett Street
- Two access points on Stiles Avenue
- Each access should have the ability to be configured to allow two entry lanes prior to an event and two exit lanes after an event
- Design specifics of the access points should incorporate considerations of pedestrian flow and fee collection areas

Several constraints and opportunities were noted, including:

- Parking supply is insufficient in the immediate area. Detailed planning should include considerations for how to accommodate parking demands
- An extension of Cohen Street, Union Street, or Selma Blvd to the arena site could provide another access to the arena. This would also offer an opportunity to extend the revitalization area (planned as part of the I-16 ramp removal) to the west side of I-16 and to help disperse arena traffic
- The new connection to the master planned I-16 ramp removal could also become a dedicated bus route or gateway connection to the east for the arena.

The existing Civic Center Site should be repurposed into the downtown area to its highest and best use to compliment the Johnny Mercer Theater to remain.

Exhibits Not Included
Available Upon Request

APPENDIX J:
BUILDING AND FIRE
CODE CONSULTATION
SERVICES



CODE CONSULTANTS, INC.

2043 Woodland Pkwy
Suite 300
St. Louis, Missouri 63146
314-991-2633 phone
314-991-4614 fax

**The Fire Protection and
Life Safety Experts**

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- Fire and Egress Modeling
- Accessibility Consultation
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- Fire Sprinkler Design
- Low Voltage Design

FIELD REPORT

TO: Ron Turner, FAIA, LEED AP
Gensler Sports

DATE: December 15, 2015

CC: Kirk Funkhouser
Gensler Sports

FROM: Tom de Greck
Matt Lescher, CASp

**PROJECT: JOHNNY MERCER THEATRE
BUILDING AND FIRE CODE CONSULTATION SERVICES
ACCESSIBILITY CONSULTATION SERVICES
CCI PROJECT NO. 150999**

Date of Visit: December 8, 2015

Time on Site: 8:30 AM – 2:00 PM

Weather: Clear

Temperature: 50's

Present at Site: Tom de Greck, CCI; Matt Lescher, CCI; Ray Bess, Savannah Civic Center

On Tuesday, December 8, 2015, CCI visited the site of the existing Johnny Mercer Theatre located in Savannah, Georgia. The purpose of the visit was to become familiar with the building and perform a high-level survey of the fire protection / life safety issues as well as accessibility for people with disabilities per the 2010 ADA Standards for Accessible Design (2010 Standards). During the visit, a number of potential deficiencies were noted. These deficiencies are outlined below.

Please note that the purpose of the survey was to identify major issues. A comprehensive survey was not completed, limited measurements were taken and issues other than those noted below exist.

Johnny Mercer Theatre

Fire Protection / Life Safety Comments

1. The building appears to comply with the requirements for Type III-B construction. Most visible structural members were steel or concrete with the exception of the roof behind the stage which is constructed of heavy timber combustible material. The combustible roof requires a Type III-B construction classification.
2. The building was not evaluated to determine compliance with the maximum allowable area for Type III-B construction.
3. The back-of-house spaces appeared to be fully sprinklered. However, the system was not evaluated for compliance. Sprinkler protection was observed at the roof above the stage. It could not be determined if sprinkler protection is provided over the spectator seating areas. Sprinkler protection is provided below the stage. Complete sprinkler protection is required for this building under the current code.

4. The sprinklers above the stage do not provide adequate protection due to the obstruction created by the catwalk. The catwalk is 50% open and NFPA 13 requires the catwalk obstruction be at least 70% open. Refer to Picture #1.
5. The spectator seats have an envelope of approximately 21". The cross aisles provide between 12"-14" of clear egress width. A complete egress analysis was not performed although the general means of egress appear to be sufficient.
6. When the stage was originally built, it appears the design intent was to enclose the stage on all 4 sides with fire rated construction. The man-door openings in these walls are protected by non-compliant horizontal sliding fire door assemblies. The current code would require self-closing or automatic-closing swing doors with a 90-minute fire resistance rating.
7. The large overhead door is protected by a fire shutter which closes upon release of a fusible link. The fusible link is located on top of the door which is unlikely to see sufficient heat to active the element. However, this design is permitted by the current code. Refer to Picture #2.
8. The building has a partial fire alarm system, but the system was not evaluated for compliance. Occupant notification was not observed within the seating area of the theater. Limited occupant notification appliances were observed in other areas of the building. The current code would require a voice alarm/communication system with proper coverage per NFPA 72 throughout the building.
9. Where provided, the occupant notification includes a voice alarm evacuation message to supplement the visual notification.
10. Manual pull stations were observed at the building exits and on the stage.
11. The stage height to the underside of the roof deck was estimated to be approximately 100 feet.
12. The stage has a proscenium opening approximately 25 feet in height.
13. An asbestos fire curtain is provided to protect the proscenium opening. The curtain can be manually opened by cutting the rope adjacent to the opening on the stage-right. The fire curtain does not appear to have any method of automatic activation which would be required by the current code. Refer to Picture #3.
14. There does not appear to be any smoke/heat venting or mechanical smoke exhaust from the area above the stage. This fire protection feature is required by the current code.
15. There are four (4) available exits from the balcony. Sufficient exit capacity appears to be provided.
16. There are six (6) exits from the main seating area. Four (4) exits are provided at the main entrance and two (2) side exits are also provided. Sufficient exit capacity appears to be provided.
17. Fire extinguishers were observed throughout the facility.
18. Two (2) hose stations were observed at the top of the balcony level.
19. There are (2) exits available from the Ballroom and as such the occupant load is limited to 499. The exit capacity from the Ballroom is 500 occupants.

20. Sprinkler protection is provide in the back-of-house areas of the Ballroom. However, the actual Ballroom is not sprinklered. Current code would require this area to be fully sprinklered.
21. Hose connections were observed at the Ballroom stairs.
22. Manual pull stations were observed at the exits from the Ballroom.
23. Two-way communication and areas of refuge were observed at the top of both Ballroom exit stairs.

Accessibility Comments

1. The cross slope of an accessible route must not exceed 1:48 (2010 Standards 403.3). The exterior route adjacent to Montgomery Street was approximately 6 percent in some areas. The cross slope leading to the ramp adjacent to Montgomery Street was approximately 5.2%.
2. Curb ramp flares must not have a slope exceeding 10 percent (406.3). The curb ramp leading from the drop off area to the ramp adjacent to Montgomery was approximately 25 percent. The concrete at the bottom of the curb ramp was in disrepair.
3. Drop off areas must provide an accessible passenger loading zone (209, 503). An accessible passenger loading zone was not provided.
4. Where not all entrances are accessible, signage must be provided indicating the route to the nearest accessible entrance (216.6). Exterior signage was not provided indicating the route to the Backstage Entrance was not provided.
5. Ramp runs must not have a slope exceeding 8.33 percent (405.2). The bottom ramp run adjacent to Montgomery Street was too steep with a slope up to 10.1%. The bottom ramp run leading from the parking lot to the Box office Entrance sloped up to 9.2 percent.
6. Curb ramps must not have a slope exceeding 8.33% (406.1, 405.2). A curb cut was not provided along Jefferson Street where the sidewalk breaks for the loading dock vehicle entry. One curb ramp leading from the parking lot to the Box Office Entrance sloped up to 9.2%.
7. Wheelchair seating must be dispersed. For 2,600 seats, at least 20 wheelchair seats must be provided (221, 802). Each wheelchair seat must be provided with a companion seat. Wheelchair seating is only located in one area which is in the back of the Theater Level 1. The wheelchair seating configuration was not set up at the time of the survey but it is likely that the space provided was not adequate for 20 accessible seats and 20 companion seats.
8. An accessible route must connect all accessible elements and spaces (206.2.4). An accessible route was not provided down the aisles on Level 1 of the Theater because the top of the ramps sloped at approximately 10 to 12.6 percent. An exception states that an accessible route is not permitted to connect fixed seating where accessible seating is not provided (206.2.4 Exception 2). Since accessible seating is not currently provided anywhere besides the back of the Theater, it is not required at the time. However, as stated in Comment #1, the wheelchair seating does not currently meet the dispersion requirement. At a time when the wheelchair seating is dispersed, wheelchair seating must be provided in areas accessed by the ramps if it is technically feasible. If it is technically feasible to provide wheelchair seating in these areas, then an accessible route must be provided to the accessible seating.

9. Where a circulation path directly connects performance areas to seating areas, an accessible route must also be provided (206.2.6). An interior accessible route is not provided from the seating areas and the stage.
10. An accessible route must connect all accessible elements and spaces (206.2.4). An accessible route was not provided to the Level 2. An exception states that an accessible route is not permitted to connect fixed seating where accessible seating is not provided (206.2.4 Exception 2). Since accessible seating is not currently provided on Level 2, the accessible route is not required at this time. However, as stated in Comment #1, the wheelchair seating does not currently meet the dispersion requirement. At a time when the wheelchair seating is dispersed, wheelchair seating must be provided on Level 2 if it is technically feasible. If it is technically feasible to provide wheelchair seating on Level 2, then an accessible route must be provided to the accessible seating.
11. Lavatories must provide a toe clearance of at least 9 inches AFF (606.2, 306). The Level 1 Men's Toilet Room only provided 8-1/2 inches.
12. Diaper changing stations must both provide an accessible approach with the surface located between 28 inches and 34 inches, provide knee and toe clearance under the surface and operable parts must be located within an accessible reach range of 15 inches and 48 inches AFF (226, 902, 309, 308). The diaper changing station in the Level 1 Family Assist Toilet Room is an inaccessible model. The knee and toe clearances were not provided and it is not possible to both provide the knee clearance and have the operable part within an accessible reach range. The Level 2 Men's Toilet Room located closest to Montgomery Street was the same type and had a table located underneath it.
13. Ambulatory accessible water closet compartments must be provided where the combined total of water closets and urinals equals 6 or more (213.3.1). The prior ADAAG did not include urinals in the fixture count when determining if an ambulatory accessible compartment was required. The Men's Toilet Rooms on Level 2 and 3 did not provide ambulatory accessible water closet compartments.
14. Water closet compartments must provide a clearance which is at least 56 inches deep for a wall mounted water closet (604.3). The Level 2 Women's Toilet Room only provided approximately 53 inches.
15. Water closets must have a seat height between 17 inches and 19 inches AFF (604.4). The Level 2 Men's Toilet Room located closest to Jefferson Street had a seat height of 20 inches.
16. Doors must provide at least 18 inches of maneuvering clearance adjacent to the latch on the pull side of the door (404.2.4). The Level 3 Women's Toilet Room only provided 6 inches. The Level 3 Men's Toilet Room only provided 7-1/2 inches.
17. Water closet compartments must provide toe clearance or must be at least 62 inches deep for a wall mounted water closet (604.8.1.4). The ADAAG required toe clearance in stalls which are 60 inches or less in depth. The Level 3 Women's Toilet Room was only 55 inches deep and did not provide toe clearance on the front partition. The Level 3 Men's Toilet Room was 55-1/2 inches deep and did not provide toe clearance on the front partition.
18. Flush valves must be located on the open side of the water closet compartment (604.6). The multiple water closets had the flush valve located on the closed side.

19. Grab bars must be clear of obstructions at least 12 inches above the surface and 1-1/2 inches below (609.3). This was not a requirement in the ADAAG. Many of the toilet paper dispensers were located above the grab bars and obstructed this clearance.
20. Where bathing facilities are provided, accessible bathing fixtures must be provided (231.2). Showers were provided in the dressing rooms but the accessible dressing room did not provide a shower.
21. Mirrors must be located at 40 inches maximum (603.3). Many of the mirrors were located too high.
22. Sales and service counters must be 36 inches maximum AFF for a width of 36 inches and extending the depth of the counter which is intended for customer use (227, 904). The only ticketing windows which were staffed at the time of the survey were 42 inches AFF.
23. Where drinking fountains are provided at least one must be provided for seated persons and one for persons having trouble bending or stooping (211.2, 602.7). Drinking fountains were not provided for standing persons.
24. Objects must be located within an accessible reach range (309, 308). According to the current regulations, operable parts must be located at a height between 15 inches and 48 inches where an unobstructed reach is provided. The ADAAG permitted a reach between 9 inches and 54 inches where an unobstructed reach with a parallel approach was provided. Some elements noted to have operable parts too high were: Vending machines, paper towel dispensers, hand sanitizer dispensers, and hand dryers.
25. Objects with the lowest leading edge located at a height between 27 inches and 80 inches AFF must not protrude more than 4 inches into the circulation path (307). Otherwise, a cane detectable barrier must be provided. Many protruding objects were found throughout the facilities. Protruding object concerns noted were: Hand sanitizer dispensers, paper towel dispensers, drinking fountains, fire extinguisher cabinets and standpipe connection valves.
26. A vertical clearance of 80 inches must be maintained throughout the circulation path (307). Otherwise a cane detectable barrier must be provided. The monumental stairs in the Lobby posed headroom issues.
27. Chairs blocked the route to the Area of Refuge.
28. Accessible parking must be provided in compliance with Table 208.1 and accessible parking must be provided in compliance with Section 502. Further evaluation is necessary to verify parking compliance.
29. Effective communication concerns including assistive listening devices were not evaluated.
30. Operational procedures and ticketing were not evaluated.
31. An accessible route must connect all accessible spaces and elements (206.2.4). An accessible route was not provided to the event room located Backstage Right (closest to Montgomery St.).

MLK ARENA

Fire Protection / Life Safety Comments

1. The construction classification appears to meet the requirements for Type II-B.
2. The majority of the arena does not have automatic sprinkler protection which is required by the current code.
3. The building has a partial fire alarm system, but the system was not evaluated for compliance. Occupant notification was observed within the seating area of the arena. Limited occupant notification was observed in other areas of the building.
4. Where provided, the occupant notification includes a voice alarm evacuation message to supplement the visual notification.
5. The aisle stairs do not have handrails which are required by the current code.
6. The guardrails do not comply with current code requirements.
7. Manual pull stations were observed at the building exits.
8. Egress from these arena appears to be adequate, but was not fully evaluated at this time.
9. Exit signage in these arena appears to be adequate, but was not fully evaluated at this time.
10. The riser height for the aisle access stairs vary between 7.5-inches and 8.5-inches. The current code does not permit variations in riser heights by more than 3/8-inch.
11. The bottom row of stairs from the upper seating area does not have a guard which would be required by the current code.

Accessibility Comments

1. MLK Ground Level is accessed from the Lobby by a platform lift. This is acceptable for existing construction (2010 Standards 206.7). However, the buttons on the inside of the platform lift did not operate the lift between levels.
2. Platform lifts must be at least 36 inches wide because the clear floor space is located in an alcove (410.3, 305.7). The rails within the platform lift do not permit this clearance.
3. Platform lifts must be located on an accessible route (402, 403). The Ground Level had a steep ramp leading to the platform lift.
4. An accessible route must connect all accessible elements and spaces (206.2.4). An accessible route was not provided to spectator seating areas. An exception states that an accessible route is not permitted to connect fixed seating where accessible seating is not provided (206.2.4 Exception 2). Accessible seating was not provided. However, fixed accessible seating must be provided.
5. In assembly areas with fixed seating, accessible seating must be provided (221.2, 802). Accessible seating was not provided within the arena.

6. Where separate sex toilet facilities are provided accessible toilet facilities must be provided (213.2). An exception permits that in alterations where it is technically infeasible to make the toilet rooms accessible, an accessible unisex is permitted to be used as long as it is located on the same level and in the same area as the separate sex toilet rooms (213.2 Exception 1). Many of the inaccessible toilet rooms did not provide an accessible unisex toilet room in the same area or on the same level. Signage was not located at many of the toilet rooms indicating the route to the nearest accessible unisex toilet room.
7. Changes in level must not exceed 1/2 inch maximum where the top 1/4 inch must be beveled at a slope not to exceed 1:2 (303). The exterior entrance between the parking lot and Ground Level of the MLK had a non-compliant threshold. The exterior entrance between Montgomery Street and Ground Level of MLK had a non-compliant threshold.
8. Objects must be located within an accessible reach range (309, 308). According to the current regulations, operable parts must be located at a height between 15 inches and 48 inches where an unobstructed reach is provided. The ADAAG permitted a reach between 9 inches and 54 inches where an unobstructed reach with a parallel approach was provided. Some elements noted to have operable parts too height were: Vending machines, paper towel dispensers, hand sanitizer dispensers, and hand dryers.
9. Objects with the lowest leading edge located at a height between 27 inches and 80 inches AFF must not protrude more than 4 inches into the circulation path (307). Otherwise, a cane detectable barrier must be provided. Many protruding objects were found throughout the facilities. Protruding object concerns noted were: Hand sanitizer dispensers, paper towel dispensers, drinking fountains, fire extinguisher cabinets and standpipe connection valves.
10. A vertical clearance of 80 inches must be maintained throughout the circulation path (307). Otherwise a cane detectable barrier must be provided. The monumental stairs in the Lobby posed headroom issues.
11. Where not all entrances are accessible, signage must be provided indicating the route to the nearest accessible entrance (216.6). Signage was not provided indicating the accessible entrances for MLK.
12. Where stairs are altered that are connected by an accessible route, compliant handrails must be provided (210.1). Further evaluation is necessary to verify handrail compliance.
13. Accessible parking must be provided in compliance with Table 208.1 and accessible parking must be provided in compliance with Section 502. Further evaluation is necessary to verify parking compliance.
14. Effective communication concerns including assistive listening devices were not evaluated.
15. Operational procedures and ticketing were not evaluated.

Please contact us with any questions.

MHL:cid

Building and Fire Code Pictures



Picture #1
(Fusible Link above overhead stage door)



Picture #2
(Catwalk sprinkler obstruction)



Picture #3
(Asbestos Curtain Instructions)

Johnny Mercer Accessibility Pictures



Item 1
(Cross Slope)



Item 1
(Cross Slope)



Item 1
(Cross Slope)



Item 1
(Cross Slope)



Item 2
(Curb Ramp)



Item 2
(Curb Ramp)



Item 3
(Passenger Loading Zone)



Item 5
(Ramp Slope)



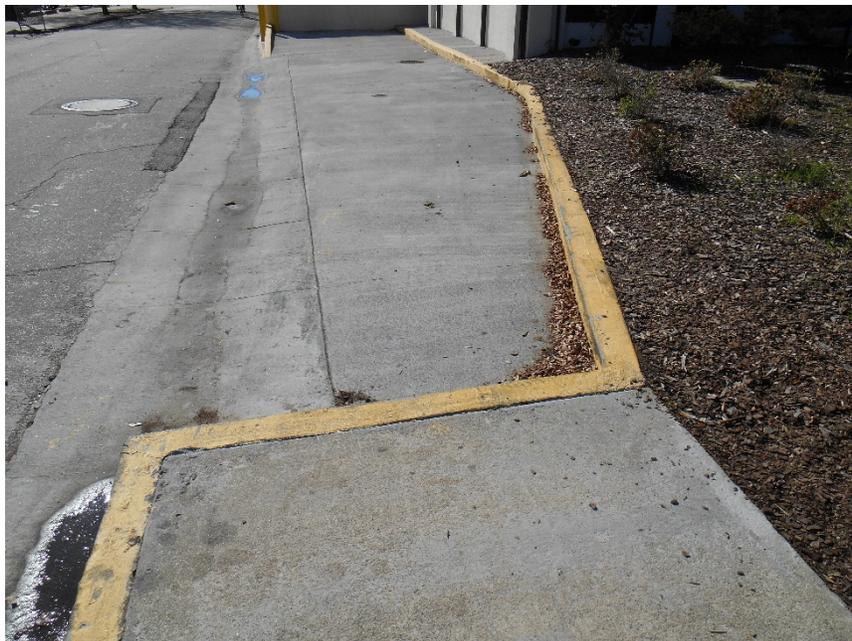
Item 5
(Ramp Slope)



Item 5
(Ramp Slope)



Item 5
(Ramp Slope)



Item 6
(Curb Ramp)



Item 6
(Curb Ramp)



Item 6
(Curb Ramp)



Item 7
(Wheelchair Seating)



Item 8
(Aisle Slope)



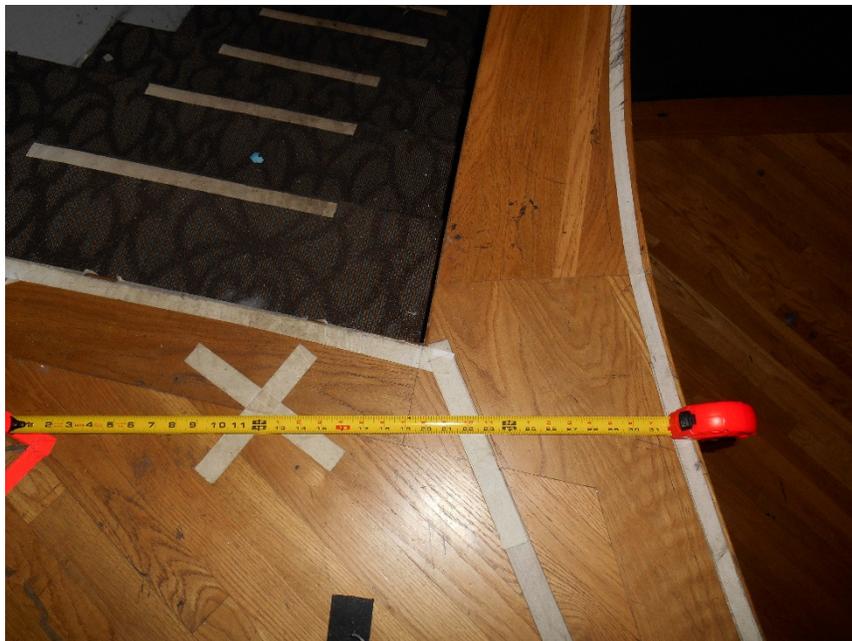
Item 8
(Aisle Slope)



Item 9
(Performance Area Access)



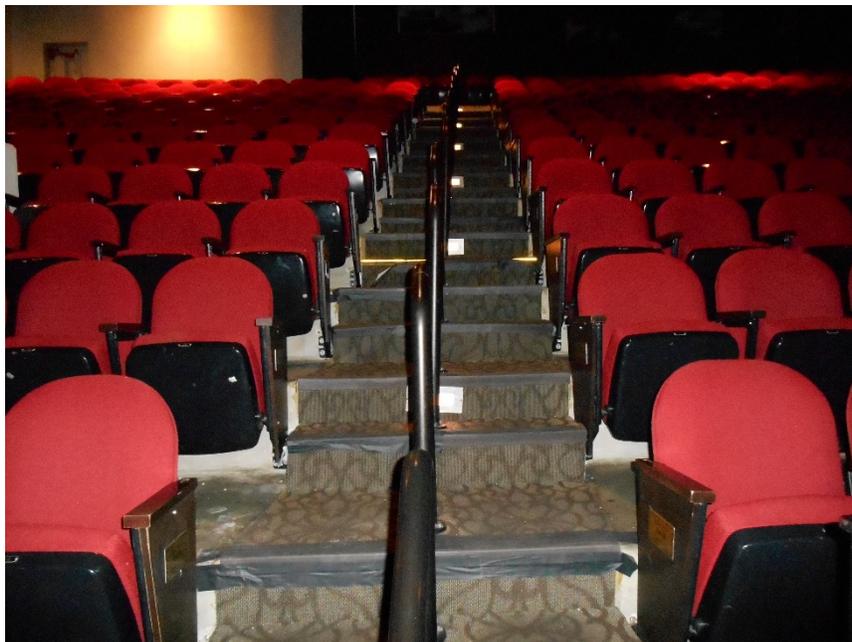
Item 9
(Performance Area Access)



Item 9
(Performance Area Access)



Item 10
(Balcony Access)



Item 10
(Balcony Access)



Item 11
(Toe Clearance)



Item 11
(Toe Clearance)



Item 12
(Diaper Changing Station)



Item 14
(Water Closet Compartment Depth)



Item 14
(Water Closet Compartment Depth)



Item 15
(Seat Height)



Item 16
(Maneuvering Clearance)



Item 16
(Maneuvering Clearance)



Item 17
(Toe Clearance)



Item 17
(Toe Clearance)



Item 19
(Grab Bar Clearance)



Item 19
(Grab Bar Clearance)



Item 19
(Grab Bar Clearance)



Item 21
(Mirrors)



Item 22
(Sales and Service Counters)



Item 23
(Drinking Fountains)



Item 24
(Reach Range)



Item 24
(Reach Range)



Item 25
(Protruding Objects)



Item 25
(Protruding Objects)



Item 25
(Protruding Objects)



Item 26
(Headroom)



Item 26
(Headroom)



Item 31
(Area of Refuge)

MLK Accessibility Pictures



Item 1
(Platform Lift)



Item 1
(Platform Lift)



Item 2
(Platform Lift)



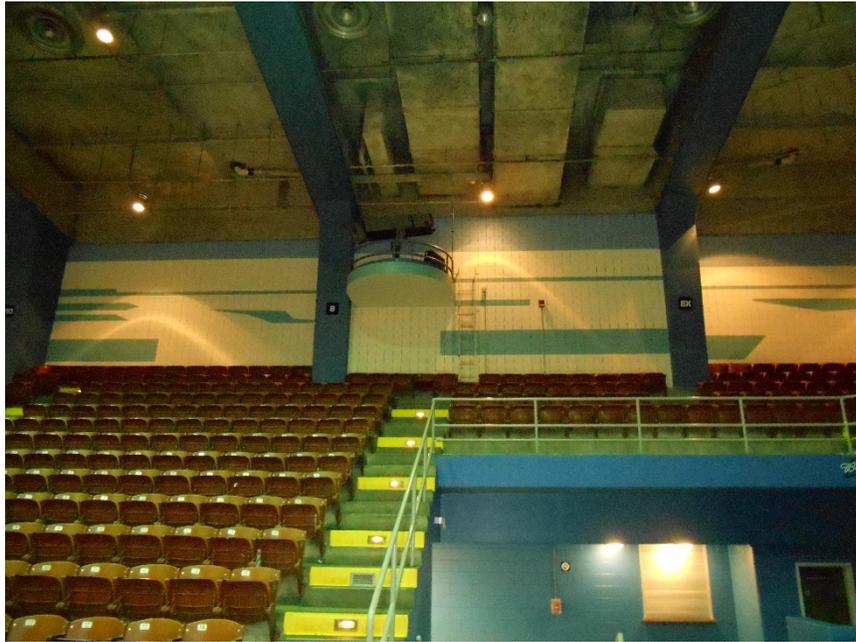
Item 2
(Platform Lift)



Item 3
(Platform Lift)



Item 4
(Seating Area)



Item 5
(Seating Area)



Item 5
(Seating Area)



Item 7
(Change in Elevation)



Item 7
(Change in Elevation)

LIMITING CONDITIONS AND ASSUMPTIONS

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This analysis is subject to our contractual terms, as well as the following limiting conditions and assumptions:

- The analysis has been prepared for internal decision making purposes of the Client only and shall not be used for any other purposes without the prior written permission of Barrett Sports Group, LLC.
- The analysis includes findings and recommendations; however, all decisions in connection with the implementation of such findings and recommendations shall be Client's responsibility.
- Ownership and management of the stadium are assumed to be in competent and responsible hands. Ownership and management can materially impact the findings of this analysis.
- Any estimates of historical or future prices, revenues, rents, expenses, occupancy, net operating income, mortgage debt service, capital outlays, cash flows, inflation, capitalization rates, yield rates or interest rates are intended solely for analytical purposes and are not to be construed as predictions of the analysts. They represent only the judgment of the authors based on information provided by operators and owners active in the market place, and their accuracy is in no way guaranteed.
- Our work has been based in part on review and analysis of information provided by unrelated sources which are believed accurate, but cannot be assured to be accurate. No audit or other verification has been completed.
- Current and anticipated market conditions are influenced by a large number of external factors. We have not knowingly withheld any pertinent facts, but we do not guarantee that we have knowledge of all factors which might influence the operating potential of the facility. Due to rapid changes in the external factors, the actual results may vary significantly from estimates presented in this report.
- The analysts reserve the right to make such adjustments to the analyses, opinions, and conclusions set forth in this report as may be required by consideration of additional data or more reliable data which may become available.
- The analysis is intended to be read and used as a whole and not in parts. Separation of any section or page from the main body of the report is expressly forbidden and invalidates the analysis.
- Possession of the analysis does not carry with it the right of publication. It shall be used for its intended purpose only and by the parties to whom it is addressed. Other parties should not rely on the findings of this report for any purpose and should perform their own due diligence.
- Our performance of the tasks completed does not constitute an opinion of value or appraisal, or a projection of financial performance or audit of the facility in accordance with generally accepted audit standards. Estimates of value (ranges) have been prepared to illustrate current and possible future market conditions.
- The analysis shall not be used in any matters pertaining to any financing, or real estate or other securities offering, registration, or exemption with any state or with the federal Securities and Exchange Commission.
- No liability is assumed for matters which are legal or environmental in nature.