DCA22LA126

AIR TRAFFIC CONTROL

Group Chair's Factual Report – Attachment 1

Facility and Controller Administrative Documentation

November 1, 2022

This attachment is a collection of all ATC administrative facility/controller documentation provided by the FAA over the course of the field phase of NTSB incident investigation DCA22LA126. All parties to the investigation were provided copies of this information. These are combined in no particular order and are not paginated. All documents were sourced from Tulsa Airport Traffic Control Tower (TUL ATCT).

There are 655 pages to this attachment including the cover page and this page, and contain the following documents:

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DAILY RECORD OF FACILITY OPERATION

PAGE NO: Page 1 of 1
DATE: Jun 8, 2022
CHECKED BY:
AIR TRAFFIC MANAGER: Joshua A. Rogers

LOCATION	IDENTIFICATION	TYPE FACILITY	OPERATING POSITION
Tulsa, OK	TUL	ATCT	ALL

	UTC TIME	REMARKS
	0500	M. GARDNER ON RWY 18L/R IN USE. WCLC.
		CFPL: EXHAUST FAN IN TOWER CAB OTS. BLDG MNTC NOTIFIED
		CFPL: ALARM ASR CHANNEL A, MOCC NOTIFIED.
		CFPL: TUL ASR-9 OTS FROM 0830-0841, CHANNEL A FAIL SWITCHED TO CHANNEL B. MOCC NOTIFIED.
		CFPL: TUL ASR OTS. -- GN
	1100	JH ON, ABV NOTED. -- JH
	1140	B. WOOD ON, ABOVE NOTED. -- BW
	1300	WCLC. -- BW
M	1557	TUL-M-2022/06/08-0001 -- FDX1170 -- BW
	1627	TUL ASR CHANNEL B BACK TO SERVICE. CHANNEL A STILL INOP -- AK
	1628	TUL DASI/WMS BACK TO SERVICE -- AK
	1800	J. ESTES ON, ABOVE NOTED. -- JD
	2100	WCLC. -- JD
	0030	RADIO BLEEDOVER OBSERVED ON 121.2 -- JD
	0145	K. MOSHER ON, ABOVE NOTED. -- JD
	0315	D. HOPSON ON, ABOVE NOTED. -- BH
	0459	COB. -- DH

I CERTIFY that entries above are correct, that all scheduled operations have been accomplished except as noted, and that all abnormal occurrences and conditions have been recorded.

SIGNATURES(S) OF WATCH SUPERVISOR(S)

FAA Form 7230-4

POSITION LOG

Fac ID: TULR Log Date: 6/8/2022
Pos ID: OS/CIC Pos Type: SI

TIME ON	Initials	TIME OFF	Code	Where Combined To:	
				Pos ID	Pos Type
0500		1059		CC	CC
1100	JH	1135	C		
1136	BW	1323	S		
1324	GQ	1357	C		
1358	BW	1506	S		
1507	AK	1652	C		
1653	BW	1803	S		
1804	JD	0157	C		
0158	BH	0314	C		
0315	JH	0329	C		
0330	JH	0459	C		

FAA Form 7230-10 (Electronic)

POSITION LOG

Fac ID: TULR Log Date: 6/8/2022
Pos ID: TS/CIC Pos Type: SC

TIME ON	Initials	TIME OFF	Code	Where Combined To:	
				Pos ID	Pos Type
0500	GN	0744	C		
0745	NY	1059	C		
1100	DH	1239	C		
1240	DB	1418	C		
1419	GQ	1519	C		
1520	DH	1622	C		
1623	GQ	1715	C		
1716	DB	1809	C		
1810	JB	1908	C		
1909	DB	1953	C		
1954	JB	2108	C		
2109	CD	2239	C		
2240	AK	2344	C		
2345	CD	0003	C		
0004	AK	0031	C		
0032	CD	0212	C		
0213	JZ	0254	C		
0255	DH	0329	C		
0330	DH	0459	C		

FAA Form 7230-10 (Electronic)

POSITION LOG

Fac ID: TULR
Pos ID: LCE

Log Date: 6/8/2022
Pos Type: LC

TIME ON	Initials	TIME OFF	Code	Where Combined To:	
				Pos ID	Pos Type
0500		1059		GC	GC
1100	GQ	1239	C		
1240	DB	1418	C		
1419	GQ	1519	C		
1520	DH	1622	C		
1623	GQ	1715	C		
1716	DB	1809	C		
1810	JB	1907	C		
1908	DB	1908	C		
1909	DB	1953	C		
1954	JB	2108	C		
2109	CD	2239	C		
2240	AK	2344	C		
2345	CD	0003	C		
0004	AK	0030	C		
0031	CD	0031	C		
0032	CD	0212	C		
0213	JZ	0254	C		
0255		0459		GC	GC
0300		0459		GC	GC

FAA Form 7230-10 (Electronic)

POSITION LOG

Fac ID: TULR
Pos ID: GC
Log Date: 6/8/2022
Pos Type: GC

TIME ON	Initials	TIME OFF	Code	Where Combined To:	
				Pos ID	Pos Type
0500	GN	0744	C		
0745	NY	1059	C		
1100	DH	1225	C		
1226	CO	1332	C		
1226	GB	1332	T		
1333	DH	1418	C		
1419	CO	1519	C		
1419	GB	1519	T		
1520	DB	1622	C		
1623	CO	1716	C		
1623	GB	1716	T		
1717	DH	1808	C		
1809	PW	1901	C		
1902	CO	1943	C		
1902	GB	1943	T		
1944	CO	1947	C		
1948	MO	2052	C		
2053	PW	2152	C		
2153	MO	2255	C		
2256	PW	2357	C		

FAA Form 7230-10 (Electronic)

POSITION LOG

Fac ID: TULR
Pos ID: GC
Log Date: 6/8/2022
Pos Type: GC

TIME ON	Initials	TIME OFF	Code	Where Combined To:	
				Pos ID	Pos Type
2358	MO	0056	C		
0057	PW	0143	C		
0144	MO	0254	C		
0255	DH	0329	C		
0330	DH	0459	C		

FAA Form 7230-10 (Electronic)

POSITION LOG

Fac ID: TULR
Pos ID: RW
Log Date: 6/8/2022
Pos Type: AP

TIME ON	Initials	TIME OFF	Code	Where Combined To:	
				Pos ID	Pos Type
0500		1059		LCE	LC
1100	JH	1135	C		
1136	JH	1234	C		
1136	ZK	1234	T		
1235	NA	1330	C		
1235	RR	1330	T		
1331	JH	1433	C		
1331	ZK	1433	T		
1434	NA	1531	C		
1434	RR	1531	T		
1532	JH	1631	C		
1532	ZK	1631	T		
1632	NA	1732	C		
1632	RR	1732	T		
1733	JH	1827	C		
1733	ZK	1827	T		
1828	NA	1828	C		
1829	NA	1915	C		
1829	RR	1915	T		
1916	JZ	1944	C		

FAA Form 7230-10 (Electronic)

POSITION LOG

Fac ID: TULR
Pos ID: RW
Log Date: 6/8/2022
Pos Type: AP

TIME ON	Initials	TIME OFF	Code	Where Combined To:	
				Pos ID	Pos Type
1945	BH	2045	C		
2046	JZ	2145	C		
2146	BH	2243	C		
2244	JZ	2347	C		
2348	BH	0044	C		
0045	JZ	0138	C		
0139	BH	0157	C		
0158	BH	0314	C		
0315	JH	0329	C		
0330	JH	0459	C		

FAA Form 7230-10 (Electronic)

POSITION LOG

Fac ID: TULR
Pos ID: FE
Log Date: 6/8/2022
Pos Type: FR

TIME ON	Initials	TIME OFF	Code	Where Combined To:	
				Pos ID	Pos Type
0500		0459		RE	AP

FAA Form 7230-10 (Electronic)

POSITION LOG

Fac ID: TULR Log Date: 6/8/2022
Pos ID: FW Pos Type: FR

TIME ON	Initials	TIME OFF	Code	Where Combined To:	
				Pos ID	Pos Type
0500		2319		RW	AP
2320	BH	2333	C		
2334		0459		RW	AP

FAA Form 7230-10 (Electronic)

POSITION LOG

Fac ID: TULR Log Date: 6/8/2022
Pos ID: LCW Pos Type: LC

TIME ON	Initials	TIME OFF	Code	Where Combined To:	
				Pos ID	Pos Type
0500		0459		LCE	LC

FAA Form 7230-10 (Electronic)

POSITION LOG

Fac ID: TULR
Pos ID: RCE

Log Date: 6/8/2022
Pos Type: CI

TIME ON	Initials	TIME OFF	Code	Where Combined To:	
				Pos ID	Pos Type
0500		0459		RW	AP

FAA Form 7230-10 (Electronic)

POSITION LOG

Fac ID: TULR
Pos ID: RCF

Log Date: 6/8/2022
Pos Type: CI

TIME ON	Initials	TIME OFF	Code	Where Combined To:	
				Pos ID	Pos Type
0500		0459		FW	FR

FAA Form 7230-10 (Electronic)

POSITION LOG

Fac ID: TULR
Pos ID: RCS
Log Date: 6/8/2022
Pos Type: CI

TIME ON	Initials	TIME OFF	Code	Where Combined To:	
				Pos ID	Pos Type
0500		0459		RSW	SR

FAA Form 7230-10 (Electronic)

POSITION LOG

Fac ID: TULR
Pos ID: RCW

Log Date: 6/8/2022
Pos Type: CI

TIME ON	Initials	TIME OFF	Code	Where Combined To:	
				Pos ID	Pos Type
0500		0459		RW	AP

FAA Form 7230-10 (Electronic)

POSITION LOG

Fac ID: TULR Log Date: 6/8/2022
Pos ID: RD Pos Type: DI

TIME ON	Initials	TIME OFF	Code	Where Combined To:	
				Pos ID	Pos Type
0500		0459		RW	AP

FAA Form 7230-10 (Electronic)

POSITION LOG

Fac ID: TULR Log Date: 6/8/2022
Pos ID: RE Pos Type: AP

TIME ON	Initials	TIME OFF	Code	Where Combined To:	
				Pos ID	Pos Type
0500		0459		RW	AP

FAA Form 7230-10 (Electronic)

POSITION LOG

Fac ID: TULR Log Date: 6/8/2022
Pos ID: RSE Pos Type: SR

TIME ON	Initials	TIME OFF	Code	Where Combined To:	
				Pos ID	Pos Type
0500		0459		RCS	CI

FAA Form 7230-10 (Electronic)

POSITION LOG

Fac ID: TULR
Pos ID: RSW

Log Date: 6/8/2022
Pos Type: SR

TIME ON	Initials	TIME OFF	Code	Where Combined To:	
				Pos ID	Pos Type
0500		0459		RW	AP

FAA Form 7230-10 (Electronic)

POSITION LOG

Fac ID: TULR Log Date: 6/8/2022
Pos ID: FD Pos Type: FD

TIME ON	Initials	TIME OFF	Code	Where Combined To:	
				Pos ID	Pos Type
0500		0459		CD	CD

FAA Form 7230-10 (Electronic)

POSITION LOG

Fac ID: TULR Log Date: 6/8/2022
Pos ID: CD Pos Type: CD

TIME ON	Initials	TIME OFF	Code	Where Combined To:	
				Pos ID	Pos Type
0500		0459		GC	GC

FAA Form 7230-10 (Electronic)

System Service Review
TUL-S-2022/06/08-0001

A1. FAC ID	A2. Date UTC (mm/dd/yyyy)	A3. Start Time UTC	A4. Emd Time UTC	A5. Position
T U L	0 6 0 8 2 0 2 2	0 9 0 0	0 9 2 0	LCE

A6. Aircraft #1			A7. Aircraft #2		
Aircraft ID	Aircraft Type/Suffix	IFR/VFR	Aircraft ID	Aircraft Type/Suffix	IFR/VFR
FDX1170	B757	IFR			

Training

1. Were any training issues identified?
O Yes ● No

Weather

1. What were the prevailing weather conditions?
O IFR ● VFR O Other

2. Was any pertinent precipitation depicted on the radar?
O Yes ● No

3. Did LLWAS alert?
O Yes ● No O N/A

4. Were weather phenomena a factor?
O Yes ● No

5. Were any SIGMETs or PIREPs in effect?
O Yes ● No

Efficiency

1. Were any efficiency issues identified?
O Yes ● No

Airspace/Airport

1. Were any airspace/airport issues identified?
O Yes ● No

Procedures

1. Were any procedural issues identified?
● Yes O No

2. Was the procedural issue covered in a local directive (including LOA)?
O Yes ● No

3. Was the procedural issue covered in a national directive?
● Yes O No

If Yes, explain
7110.65 3-1-9 Use of tower radar displays. The controller did not comply, by ensuring the aircraft was aligned to the proper runway.

4. How long has the procedure been in place?
O Less than 3 months O Between 3 and 6 months ● Longer than 6 months O Unknown

Printed by Henry Nagy on 6/23/2022

System Service Review
TUL-S-2022/06/08-0001

Procedures (continued)

5. Were any potential systemic procedural issues identified?
O Yes ● No

Directives

1. Were any directive issues identified?
O Yes ● No

Equipment

1. Were any equipment issues identified?
● Yes O No

2. Was all communications equipment functioning properly?
● Yes O No

3. was all airborne radar equipment functioning properly?
● Yes O No O N/A

4. Was all surface detection radar equipment functioning properly?
O Yes O No ● N/A

5. Was all approach NAVAID equipment functioning properly?
● Yes O No O N/A

6. Was all airport lighting equipment functioning properly?
● Yes O No O N/A

7. Was all operational automation radar equipment functioning properly? (i.e. HOST, STARS, ARTS, ASDE, etc.)
● Yes O No O N/A

8. Was all operational automation radar equipment configured correctly? (i.e. airspace combination, ASDE configuration, etc.)
O Yes O No ● N/A

9. Was all inoperative equipment properly coordinated as out of service across ATO organizations?
(i.e. En-Route, Terminal, Sys Ops, Tech Ops, etc.)
O Yes O No ● N/A

10. Was all inoperative equipment properly NoTAMed as out of service?
O Yes O No ● N/A

11. Were any potential systemic equipment issues identified?
● Yes O No

If Yes, explain
The condensation on the tower windows creates an expectation bias where scanning proves challenging. Having ASSC/ATAP as a backup system would help reduce the wrong surface events.

System Service Review
TUL-S-2022/06/08-0001

Customer Feedback

1. Was there customer feedback regarding the operation during this review session?

● Yes O No

2. Did the feedback express customer praise?

O Yes ● No

3. Did the feedback express customer concern?

● Yes O No

If Yes, explain

FDX1170 reported they needed taxi instructions because they landed on the wrong runway.

4. Was the feedback validated?

● Yes O No

If Yes, explain

Through review of the event, it was validated that FDX landed on the wrong runway.

Resource Management

1. Were any resource management issues identified?

O Yes ● No

Individual Performance

1. Was any notable Individual performance identified? (Exemplary and/or needing improvement)

● Yes O No

	Position
	GC

Explanation

The employee did not validate the proper alignment of the aircraft with the runway of intended landing and did not issue a brasher warning.

QC Findings

Currently briefing all employees face to face, direct monitor OSA's 4 per quarter over the next two quarters.

Reach out to the program office to see the feasibility of getting ASSC/ATAP into the facility to help provide redundancy. Continue to address the condensation on the windows of the tower cab. Work with the LSC to identify any possible blind spots at TUL.

Review Team

Performance Record of Conference

Employee: Kristi Lauren Hopson **Conducted by:** Benjamin A Field **Date:** 3/25/2021

Summary of discussion: **ATSAP Filed:** No

On 3/35/21, while working Local control, you had an emergency B737 inbound to TUL that had hydraulic system failure. Your outstanding skills and professionalism allowed you to assist the emergency aircraft with the best service you could have provided given the nature of the emergency. Excellent Job!!

Conductor Signature _____ Date _____ Employee Signature _____ Date _____

When finished, sign and give copy to employee

Printed by Blake Wood on 6/9/2022

Performance Record of Conference

Employee: Kristi Lauren Hopson **Conducted by:** Benjamin A Field **Date:** 11/19/2021

Summary of discussion: **ATSAP Filed:** No

During this time you were working LCE during an emergency AAH715 inbound to TUL due to a fuel leak coming from right wing of aircraft. You efficiently coordinated with ground control to relay all pertinent information to emergency responders and coordinated the access of the emergency responders to follow the aircraft to parking to ensure their safety. Excellent job!!!

Conductor Signature _____ Date _____ Employee Signature _____ Date _____

When finished, sign and give copy to employee

Printed by Blake Wood on 6/9/2022

Performance Record of Conference

Employee: Matthew Gardner **Conducted by:** Blake Andrew Wood **Date:** 5/24/2021

Summary of discussion: **ATSAP Filed:** No

While Matt was training on RSW he did a good job handling SCU51 inbound to RVS with gear issues who had declared an emergency

.

Conductor Signature Date Employee Signature Date

When finished, sign and give copy to employee

Printed by Blake Wood on 6/9/2022

Performance Record of Conference

Employee: Matthew Gardner **Conducted by:** Blake Andrew Wood **Date:** 11/2/2021

Summary of discussion: **ATSAP Filed:** No

While Matt was assigned to the Tower he did an exceptional job with handling the Flight Check operations that occurred at Tulsa on Tuesday 11/2. Good job and thank you Matt.

Conductor Signature Date Employee Signature Date

When finished, sign and give copy to employee

Printed by Blake Wood on 6/9/2022

ECV Checklist for TUL - Tulsa Intl (Combined Tower/TRACON)
Scheduled Dates: 10-Feb-2020 - 27-Feb-2020
ECV Complete Date: 28-Feb-2020
CVT Year: 2020
Primary Evaluator: Henry P Nagy
Secondary Evaluator: George E Sant
111 of 111 items

id	Item	Description	Reference	Evaluation Area	ECV Rating	ECV Approval	Mitigation Plan?
1	Abbreviated Departure Clearances	Controllers use approved abbreviated departure clearances and phraseology	7110.65 par 4-3-3	Operations	Compliant	27-Feb-2020	
2	Abbreviated Transmissions	Controllers use standard abbreviated transmissions phraseology	7110.65 par 2-4-9	Operations	Compliant	27-Feb-2020	
359	Air Traffic Control Operational Contingency Plans	Air Traffic Managers are responsible to have Operations Contingency Plans (OCPs) in place to respond to events that affect the Operational Contingency Levels (OCLs) of their facility to provide ATC services. Reference: FAA JO 1900.47 Air Traffic Control Operational Contingency Plans a. Ensure that the OCP conforms to the current version of the FAA JO 1900.47 Chapter 3, Documentation. b. Complete the annual requirements by December 31 of each calendar year. 1. Ensure that all	1900.47 Ch 2 Section J; Ch 5 Section C	Operations	Compliant	27-Feb-2020	

		network support agreements have been reviewed 2. Ensure that a facility ATC Zero exercise is conducted unless an actual ATC Zero or ATC Limited event occurred during the year. 3. Ensure certification of the facility OCP and support procedures in the National OCP Database. 4. Ensure certification of contact information in OCPs in the National OCP Database. c. Ensure the facility has conducted refresher training on the OCP in accordance with FAA JO 3120.4 Air Traffic Technical Training, which includes: 1. Airspace divestment/assumption procedures 2. Use of CPSS information, where applicable 3. Operationally relevant information seen during an exercise or event.					
8	Airport Conditions	Controllers provide timely information regarding landing area conditions using prescribed phraseology	7110.65 ch 3 sec 3; par 4-7-12b and c	Operations	Compliant	27-Feb-2020	

9	Airport Construction	Facility management follow applicable requirements when dealing with airport construction	7210.3 par 10-3-12 and 10-3-13	Operations	Not Observed	27-Feb-2020	
ECV Rating Text The ECV Team was unable to observe this item during the visit. Posted by Henry P Nagy on 13-Feb-2020							
11	Altimeter Issued and Requirements	Altimeter issued in accordance with prescribed procedures	7110.65 Ch 2 Sec 7; 7210.3 par 2-10-3 and 2-10-4	Operations	Compliant	27-Feb-2020	
12	Altimeter Requirements	Comparison checks are accomplished as required	7210.3 par 2-10-3 and 2-10-4	Operations	Compliant	27-Feb-2020	
13	Altitude Assignment and Verification	Controllers apply standardized application of procedures, assigning and verifying altitudes and standard phraseology	7110.65 ch 4 sec 5	Operations	Compliant	27-Feb-2020	
14	Altitude Filter Limits	Mode C targets and data blocks are displayed correctly through the use of appropriate altitude limits and display filters	7110.65 par 5-2-24	Operations	Compliant	27-Feb-2020	
15	Anticipating Separation	Takeoff or landing clearances need not be withheld until prescribed separation exists	7110.65 par 3-9-5 and 3-10-6	Operations	Compliant	27-Feb-2020	
16	AOV Credentialing	All requirements for conducting and recording initial credential ratings and biennial skill evaluations and completing return to duty plans are followed	8000.90	Administrative	Compliant	27-Feb-2020	

17	Approach Clearance Procedures and Phraseology	Controllers issue approach clearances, adhere to separation minima, and issue alternate missed approach instructions using prescribed phraseology	7110.65 ch 4 sec 8; ch 7 sec 4; par 4-7-6 and 4-7-10	Operations	Compliant	27-Feb-2020	
18	Approach Information and Arrival Procedures - Instructions	Controllers provide radar frequency, beacon changes, and advance approach information	7110.65 par 4-7-1	Operations	Compliant	27-Feb-2020	
19	Approach Separation Minima	Controllers adhere to separation minima for approach procedures	7110.65 par 5-9-5	Operations	Compliant	27-Feb-2020	
20	Arrival and Approach Information and TCP	Controllers provide arrival and approach information and execute TCP	7110.65 par 4-7-10 and 4-7-11	Operations	Compliant	27-Feb-2020	
21	Arrival Procedures	Controllers meet required elements and phraseology requirements	7110.65 ch 3 sec 10; ch 4 sec 7; par 5-9-4 and 5-9-5	Operations	Compliant	27-Feb-2020	
22	Arrival Weather, Airport Conditions	Controllers provide and solicit weather information, airport conditions, and below minima reports as required	7110.65 par 4-7-7; 4-7-11 and 4-7-12a	Operations	Compliant	27-Feb-2020	
25	ATIS Procedures	ATIS duties including content, code broadcast and review	7110.65 ch 2 sec 9	Operations	Compliant	27-Feb-2020	
26	Automated Information Transfer (AIT)	AIT is conducted under the proper conditions	7110.65 par 5-4-8	Operations	Compliant	27-Feb-2020	

28	Battery Transceivers	Back-ups are checked once a week	7210.3 par 3-3-5	Operations	Noncompliant - Low	28-Feb-2020	
ECV Rating Text PET 2000 is not checked on battery power. The TUL Tower Watch Checklist states: Battery powered transceivers. (day shift). ECV learned that the PET is not checked daily. TECHOPS does test the PET 2000 monthly Posted by Henry P Nagy on 20-Feb-2020							
30	Bird Hazard Procedures/Advisories	Controllers issue bird activity advisories using prescribed phraseology. Required notifications are accomplished.	7110.65 par 2-1-23	Operations	Compliant	27-Feb-2020	
32	Call Sign Usage	Aircraft identification and similar sounding call signs are handled as required	7110.65 par 2-4-15 and 2-4-20	Operations	Compliant	27-Feb-2020	
33	Class B/C/D Airspace Operations	Controllers provide Class B/C/D services and phraseology	7110.65 par 3-1-11; ch 7 sec 7 through 9	Operations	Compliant	27-Feb-2020	
34	Clearances	Controllers use standardized manual and automated clearance formats and phraseology	7110.65 ch 4 sec 2 and 4; par 4-3-4	Operations	Compliant	27-Feb-2020	
40	Coordinate Use of Airspace	Controllers ensure necessary coordination is accomplished	7110.65 par 2-1-14 and 2-1-16	Operations	Compliant	27-Feb-2020	
41	Coordinating Delays	Controllers meet requirements for forwarding delays and coordinating departure clearances	7110.65 par 4-3-7 through 4-3-10	Operations	Compliant	27-Feb-2020	
42	Covered Event Reviews (CER)	CERs are conducted as directed and are completed in accordance with applicable directive	7210.634 par 3-4	Quality Control	Not Observed	27-Feb-2020	

ECV Rating Text The ECV Team was unable to observe this item during the visit. Posted by Henry P Nagy on 13-Feb-2020							
44	Data Blocks	Controllers display and retain data blocks as required	7110.65 par 5-3-9a and 5-15-8	Operations	Compliant	27-Feb-2020	
46	Data Entries/Display Data	Use of scratch pad entries, system information, select/inhibit switches	7110.65 par 5-15-5; 7210.3 par 3-9-1	Operations	Compliant	27-Feb-2020	
48	Delay Reporting	Facility reports delays as required	7210.3 par 18-5-12; 7210.55G	Operations	Not Observed	27-Feb-2020	
ECV Rating Text The ECV Team was unable to observe this item during the visit. Posted by Henry P Nagy on 13-Feb-2020							
49	Delays	Controllers use standard procedures and phraseology associated with departure delays, releases, ground stops, and delay sequencing	7110.65 par 4-3-4 through 4-3-7	Operations	Not Observed	27-Feb-2020	
ECV Rating Text The ECV Team was unable to observe this item during the visit. Posted by Henry P Nagy on 13-Feb-2020							
51	Departure Procedures	Controllers meet required elements and phraseology requirements	7110.65 ch 3 sec 9; ch 4 sec. 3; ch 5 sec 8	Operations	Compliant	27-Feb-2020	
52	Emergency Frequencies	Facility ensures emergency frequencies are monitored continuously, in working order, and checked regularly	7210.3 par 3-3-3 and 3-3-4	Operations	Compliant	27-Feb-2020	

53	Emergency Procedures	Requirements are met for providing services in/to an emergency in accordance w/ prescribed procedures	7110.65 ch 10 sec 1 and 2	Operations	Not Observed	27-Feb-2020	
ECV Rating Text The ECV Team was unable to observe this item during the visit. Posted by Henry P Nagy on 13-Feb-2020							
59	Flight Check Handling	Controllers use standard flight check handling procedures	7110.65 ch 9 sec 1	Operations	Not Observed	27-Feb-2020	
ECV Rating Text The ECV Team was unable to observe this item during the visit. The last Flight Check occurred during September 2019. New Flight Policy Memo was briefed in a timely manner. Posted by Henry P Nagy on 13-Feb-2020							
62	GENOT Handling	Ensure that all employees with a need to know are thoroughly briefed prior to performing duties	7210.3 par 2-2-8	Operations	Compliant	27-Feb-2020	
66	Hazardous Weather Broadcast Procedures and Phraseology	Controllers/Specialists use correct procedures and phraseology for HIWAS broadcast	7110.65 par 2-6-6	Operations	Compliant	27-Feb-2020	
65	Helicopter Operations	Controllers apply standard procedures (including locally developed) and phraseology	7110.65 ch 3 sec 11	Operations	Not Observed	27-Feb-2020	
ECV Rating Text The ECV Team was unable to observe this item during the visit. Posted by Henry P Nagy on 13-Feb-2020							
67	Inflight Equipment Malfunctions	Controllers properly follow procedures for inflight equipment malfunctions	7110.65 par 2-1-7	Operations	Not Observed	27-Feb-2020	

ECV Rating Text The ECV Team was unable to observe this item during the visit. Posted by Henry P Nagy on 13-Feb-2020							
68	Interphone Format	Standard format is used on interphone	7110.65 par 2-4-8 through 2-4-14	Operations	Compliant	27-Feb-2020	
69	Interphone, Frequency Monitoring and Testing	Controllers/Specialists monitor interphones and radio frequencies continuously (to include emergency frequencies when required)	7110.65 par 2-4-2; 7210.3 par 3-3-3 and 3-3-4 (check for emergency frequency testing)	Operations	Compliant	27-Feb-2020	
70	Intersecting Runway Separation	Controllers apply standard separation during intersecting runway operations	7110.65 par 3-9-8 and 3-10-4	Operations	Compliant	27-Feb-2020	
71	Intersection Departures	Intersection departure procedures are applied as required	7110.65 par 3-7-1c; d and e; 7210.3 par 2-1-13	Operations	Compliant	27-Feb-2020	
73	Line Up and Wait (LUAW)	Controllers use proper phraseology and procedures and traffic is exchanged as required	7110.65 par 3-9-4; 3-10-5b and c; 3-10-6b; 7210.3 par 2-6-5c and 10-3-8	Operations	Not Observed	27-Feb-2020	
ECV Rating Text The ECV Team was unable to observe this item during the visit. Posted by Henry P Nagy on 13-Feb-2020							
74	Local/Ground Coordination	Controllers ensure coordination is completed and phraseology was correct	7110.65 3-1-3 and 3-1-4; 7210.3BB 3-4-1	Operations	Compliant	27-Feb-2020	

75	Low Level Wind Shear/Microburst Advisories	Using prescribed phraseology, controllers provide wind shear and microburst advisories as reported by equipment and/or pilots	7110.65 par 3-1-8; 7210.3 par 2-10-1a and b	Operations	Not Observed	27-Feb-2020	
ECV Rating Text The ECV Team was unable to observe this item during the visit. Posted by Henry P Nagy on 13-Feb-2020							
78	Memory Aids	Facility implements their directive that clearly defines coordination responsibilities and safeguards to prevent inadvertent use of runways	7210.3 par 10-1-7	Operations	Noncompliant - Low	28-Feb-2020	
ECV Rating Text The Memory aid for LUAW was in use when LUAW not authorized. Per TUL SOP: When LUAW operations are being conducted, the LC must have the yellow "LUAW" strip holder prominently displayed. TUL does not have a memory aid that indicates LUAW is not in effect. Posted by Henry P Nagy on 27-Feb-2020							
79	Merging Target Procedures	Controllers apply merging target procedures as required	7110.65 par 5-1-8	Operations	Compliant	27-Feb-2020	
83	Mode C Validation	Controllers use prescribed phraseology for assigning and verifying altitudes	7110.65 par 5-2-18 through 5-2-22	Operations	Compliant	27-Feb-2020	
84	MSAW/Conflict/MCI Alert	Controllers take appropriate action with E-MSAW, conflict alert, and MCI requirements when a CA or MCI alert is displayed	7110.65 par 5-15-6 and 5-15-7	Operations	Compliant	27-Feb-2020	

85	Multiple Instrument Approach Procedures	Controllers use prescribed procedures and phraseology when providing multiple instrument approach service ? Controllers provided a minimum of 1,000 feet vertical or a minimum of 3 miles radar separation between aircraft during turn on to final approach course ? Controllers provided a minimum of 1.5 miles radar separation diagonally between successive aircraft on adjacent localizer/azimuth courses when runway centerlines were at least 2,500 feet but no more than 4,300 feet apart	7110.65 par 5-9-6 through 5-9-9; 7110.98	Operations	Compliant	27-Feb-2020	
88	NAVAID Monitoring Directive and Application	Monitoring instructions are included in a facility directive and restoration and reporting NAVAID malfunctions are in accordance with local national requirements	7210.3 par 3-5-1	Operations	Compliant	27-Feb-2020	
90	NORDO/NORAC Aircraft	Proper procedures regarding NORDO/NORAC Aircraft are followed	7110.65 par 10-4-4; 7610.4 ch 7 sec 2 & 3	Operations	Not Observed	27-Feb-2020	
ECV Rating Text The ECV Team was unable to observe this item during the visit. Posted by Henry P Nagy on 13-Feb-2020							

93	NOTAM Distribution	Personnel adhere to standardized distribution of received NOTAM information to other ATC facilities	7210.3 par 6-3-2 and para 6-3-4d3; 7930.2 par 3-1-2a; 3-2-1; and 3-2-2	Operations	Not Observed	27-Feb-2020	
ECV Rating Text The ECV Team was unable to observe this item during the visit. Posted by Henry P Nagy on 13-Feb-2020							
95	NOTAM Handling	NOTAMs are included on checklists and status information areas and briefed to personnel	7210.3 6-3-4d.3; 7930.2 par 1-3-1a and b; 2-2-3; 3-2-1 and 3-2-2	Operations	Compliant	27-Feb-2020	
106	OJTI Selection, Certification and Evaluation	OJTIs are selected certified and evaluated in accordance with National Directive	3120.4; Ch 6	Training	Compliant	27-Feb-2020	
107	Operational Currency	Operational and staff personnel maintain currency as required	7210.3 Ch 2; Section 3	Operations	Noncompliant - Low	28-Feb-2020	
ECV Rating Text A recertification for a CPC and a Recertification for an employee in training status were not entered into FAA 3120-1. Per FAA 3120-4P Chapter 4 .5 Reports reflecting position certifications, re-certifications prior to being facility rated, and all written and performance-based examinations required by the IPG must be retained for 1 year after the employee is facility rated. FAA Forms 3120-25/26/32/36 utilized for CPC/FPL/TMC recertification may be disposed of after the recertification has been documented with all appropriate signatures on the Training and Proficiency Record, FAA Form 3120-1, section III or TRAX. Posted by Henry P Nagy on 20-Feb-2020							
108	Operational Oversight	FLM/CIC/OS monitors operation, anticipates traffic flow, manages and eliminates distractions, and takes appropriate actions	7210.3 par 2-6-1; 2-6-2; 2-6-5a; 2-6-6; 5-1-2b and 5-3-7e	Operations	Compliant	27-Feb-2020	
295	Operational Reference Material	7210.3 para 214. REFERENCE FILES		External	Noncompliant - Low	28-Feb-2020	

ECV Rating Text The following items were outdated in the tower cab: Order 1900.47D, ATC Operational Contingency Plans, (1900.47E w/change 1 is current), Order 7610.4T, Special Operations, (7610.4V is current). An obsolete DEN number was in the TUL OCP. Expired FAA 8030-3 forms, and outdated references to District personnel were found in the tower. Posted by Henry P Nagy on 27-Feb-2020							
287	Opposite Direction Operations (ODO)	Description: The facility has developed procedures that have been approved by the service area Director Of Operations (through the Operations Support Group). The facility has captured those procedures in a local directive. The facility complies with those procedures.	7210.3 par. 2-1-34; ATO-SG-15-7 ODO	Operations	Not Observed	27-Feb-2020	
ECV Rating Text The ECV Team was unable to observe this item during the visit. Posted by Henry P Nagy on 13-Feb-2020							
110	Overdue Aircraft	Controllers gather and share information on overdue aircraft and properly complete applicable control actions	7110.65 par 10-3-1; 10-3-2; 10-3-6 and 10-4-1 through 10-4-3	Operations	Not Observed	27-Feb-2020	
ECV Rating Text The ECV Team was unable to observe this item during the visit. Posted by Henry P Nagy on 13-Feb-2020							
116	PIREP Information	Controllers solicit, broadcast, and disseminate PIREPs, as required, using prescribed phraseology	7110.65 par 2-6-2	Operations	Compliant	27-Feb-2020	

117	Point Out Procedures	Controllers use point out procedures and phraseology either manually or via an automated method, as required	7110.65 par 5-4-2c; 5-4-3 and 5-4-7	Operations	Compliant	27-Feb-2020	
118	Position Certification Process	Facilities follow established requirements and procedures for OJT and position certification process	3120.4; Chapter 6	Training	Noncompliant - Low	28-Feb-2020	
ECV Rating Text A Certification for RW on Jan 23, 2020 was marked "NEEDS IMPROVEMENT" for G24 and G25. Skill Checks did not have 12A references as required. Posted by Henry P Nagy on 20-Feb-2020							
119	Position Determination	Determine position of aircraft prior to issuing instructions or clearance	7110.65 par 3-1-7	Operations	Compliant	27-Feb-2020	
120	Position Relief Briefings	Controllers/Specialists ensure position briefings are completed and recorded, and checklists are used	7110.65 Appendix A; 7210.3 par 2-2-4 and 2-2-6	Operations	Compliant	27-Feb-2020	
121	Position Staffing	Assign personnel to positions as required by activity, equipment, and facility function	7210.3 ch 2 sec 6	Operations	Compliant	27-Feb-2020	
238	pre-duty familiarization	Operational personnel review pre-duty briefing items prior to working a control position. Ref 7210.3 par. 2-2-4		External	Compliant	27-Feb-2020	

122	Prearranged Coordination	Specialists comply with the prearranged coordination procedures that have been established and published in a facility directive/LOA	7110.65 par 5-3-9b; 5-4-9 and 5-15-4e	Operations	Not Observed	27-Feb-2020	
ECV Rating Text The ECV Team was unable to observe this item during the visit. Posted by Henry P Nagy on 13-Feb-2020							
123	Precision Approach Critical Areas/ Precision Obstacle Free Zones	Precision Approach Critical Areas and Precision Obstacle Free Zones are described, depicted, and protected, when required	7110.65 par 3-3-7; 3-7-5 and 3-7-6	Operations	Compliant	27-Feb-2020	
127	Qualification Training	All required employees receive field qualification training IAW National and Local Directives	3120.4 par 4-2 and app D; F; G and H	Training	Compliant	27-Feb-2020	
128	Quality Control Monitoring	Quality Control Operational Skill assessments (QCOSA) are performed in accordance with applicable directive and include identified emphasis items (EI) as required	7210.634 ch 3	Quality Control	Noncompliant - Low	28-Feb-2020	
ECV Rating Text The required OSA for CIC 3120-36 was not conducted. Posted by Henry P Nagy on 20-Feb-2020							
129	Quality Control Programs	Quality Control Checks (QCC) and Quality Control Validations (QCV) are completed as required	7210.634 ch 6	Quality Control	Noncompliant - Low	28-Feb-2020	

ECV Rating Text The required Quality Control Checks (QCC) were not conducted. Quality Control Validations (QCV) documents uploaded into CEDAR were marked in error. Posted by Henry P Nagy on 20-Feb-2020							
131	Radar Handoff Procedures	Controllers use specified radar handoff phraseology and procedures	7110.65 par 2-1-15; 5-4-1 and 5-4-3 through 5-4-6	Operations	Compliant	27-Feb-2020	
132	Radar Identification Methods	Controllers use specified radar identification procedures and phraseology	7110.65 par 5-3-2 through 5-3-7	Operations	Compliant	27-Feb-2020	
133	Radar Termination	Controllers apply standard radar termination procedures and phraseology	7110.65 par 5-1-13	Operations	Compliant	27-Feb-2020	
134	Radar Vectoring	Controllers use standard radar vectoring procedures and phraseology	7110.65 ch 5 sec 6	Operations	Compliant	27-Feb-2020	
135	Radio Communication	Controllers/Specialists use standard radio transmission format and phraseology and apply correct readback/hearback procedures and phraseology	7110.65 par 2-1-17; 2-4-3; 2-4-8 and 2-4-14 through 2-4-22	Operations	Compliant	27-Feb-2020	
136	Refresher Training	Each facility must establish and comply with a written annual refresher training program	3120.4 Ch 4 par 5b and Appendix A	Training	Compliant	27-Feb-2020	
137	Remedial Training	Remedial Training is administered in accordance with National Directive	3120.4 Ch 4 par 6	Training	Not Observed	27-Feb-2020	

ECV Rating Text The ECV Team was unable to observe this item during the visit. Posted by Henry P Nagy on 13-Feb-2020							
138	Runway Exiting	Controllers use prescribed procedures, including those in a local directive, for aircraft exiting runways	7110.65 par 3-10-9	Operations	Compliant	27-Feb-2020	
139	Runway Utilization	Controllers apply standardized procedures and phraseology to arrival and departures using the runways	7110.65 ch 3 sec 5 and 8; par 3-7-1c through e; 7210.3 par 10-1-6	Operations	Compliant	27-Feb-2020	
140	RVR Issuance	Controllers issue runway visual range, when required	7110.65 par 2-8-1 through 2-8-3	Operations	Not Observed	27-Feb-2020	
ECV Rating Text The ECV Team was unable to observe this item during the visit. Posted by Henry P Nagy on 13-Feb-2020							
142	Safety Alerts	Controllers apply safety alert requirements and phraseology	7110.65 par 2-1-6	Operations	Compliant	27-Feb-2020	
144	Same Runway Separation	Controllers apply standard separation on same runway operations	7110.65 par 3-9-6 and 3-10-3	Operations	Compliant	27-Feb-2020	
147	Skill Enhancement Training	Skill enhancement training meets required elements of prescribed procedures	3120.4 Ch 4; Section 5d	Training	Compliant	27-Feb-2020	
268	SOP/LOA Reviews	Review LOAs/SOPs for accuracy and completeness of data annually and as needed.	7210.3 paras 2-1-2; 2-1-3; 2-1-4; 2-1-5; 2-1-6; 2-2-14; 3-3-2; 4-3-3;4-3-5; 4-3-6	Operations	Compliant	27-Feb-2020	

148	Special Flight Handling	Standard procedures are followed when handling Special Flights	7110.65	Operations	Not Observed	27-Feb-2020	
ECV Rating Text The ECV Team was unable to observe this item during the visit. Posted by Henry P Nagy on 13-Feb-2020							
151	Special VFR	Controllers use standard procedures and phraseology for Special VFR operations	7110.65 ch 7 sec 5	Operations	Not Observed	27-Feb-2020	
ECV Rating Text The ECV Team was unable to observe this item during the visit. Posted by Henry P Nagy on 13-Feb-2020							
152	Speed Adjustments	Controllers use standard speed control application, methods, minima, and phraseology	7110.65 ch 5 sec 7	Operations	Compliant	27-Feb-2020	
153	Strip Marking	Controllers use standard flight progress strip marking	7110.65 par 2-3-1; 2-3-4 and 2-3-5 through 2-3-10	Operations	Compliant	27-Feb-2020	
155	Supplemental Training	Training provided prior to effective date of new/revised procedures, regulations or equipment, etc.	3120.4 Ch 4 par 5C and Appendix A	Training	Compliant	27-Feb-2020	
156	System Service Review (SSR)	SSRs are conducted and documented as required and events were documented and closed	7210.634 ch 4	Quality Control	Noncompliant - Low	28-Feb-2020	Has Plan
ECV Rating Text TUL completed only one SSR in FY19. The TUL sampling plan calls for one SSR per Quarter. Posted by Henry P Nagy on 20-Feb-2020							

157	Systemic Issue Reviews (SYSIR)	SYSIRs are conducted when issues that have potential system impact have been identified and are completed in accordance with applicable directive	7210.634 par 4-5	Quality Control	Compliant	27-Feb-2020	
158	Taxi/Ground Movement Procedures	Controllers provide clearance instructions using prescribed procedures and phraseology	7110.65 par 3-7-1 through 3-7-4; 7210.3 par 10-3-11; AC 120-57A	Operations	Compliant	27-Feb-2020	
159	TCAS/TAWS	Controllers handle TCAS/TAWS resolution advisories and reporting as required	7110.65 par 2-1-28	Operations	Not Observed	27-Feb-2020	
ECV Rating Text The ECV Team was unable to observe this item during the visit. Posted by Henry P Nagy on 13-Feb-2020							
162	TM Responsibilities of FLM/CIC and ATCS	FLM/CICs and ATCSs work to manage flows of traffic as required	7110.65 par 11-1-2b and c	Operations	Not Observed	27-Feb-2020	
ECV Rating Text The ECV Team was unable to observe this item during the visit. Posted by Henry P Nagy on 13-Feb-2020							
163	Tower Radar Displays	Use of tower radar displays	7110.65 par 3-1-9; 7210.3 par 10-5-3	Operations	Compliant	27-Feb-2020	
164	Traffic Advisories	Controllers apply traffic advisories as required	7110.65 par 2-1-21	Operations	Compliant	27-Feb-2020	
259	Training and Proficiency Record (FAA Form 3120-1)	All entries, including the employee's initials and certification signature, must be recorded on FAA Form 3120-1 or the TRAX computer program no later than		External	Noncompliant - Low	28-Feb-2020	

		120 calendar days following the month in which the training was completed. By initialing or signing, the employee acknowledges that the training recorded has been provided. Operating initials must be used. Certified TRAX records must be retained in section IX of the employee's FAA Form 3120-1.					
ECV Rating Text Mandatory briefing items not pertaining to qualification, certification, proficiency, or management training (e.g., Standards of Conduct, Drug Awareness, The Performance Management System, etc.), must not be recorded on Form 3120-1. Fire Life Safety Video was recorded as Proficiency Training. SET incorrectly recorded in FAA 3120-1 for CPC-IT and DEV controllers. CIC Refresher 19-153 entered twice on employee 3120-1. Additional OJT hours must be documented in section III of FAA Form 3120-1. TRAX and FAA3120-1 certification times did not match FAA 3120-25 form and exceeded the authorized hours. Posted by Henry P Nagy on 20-Feb-2020							
170	Vectoring to Final Approach	Aircraft were vectored to the final approach course to intercept at the applicable point using proper procedures and phraseology	7110.65 par 5-9-1 through 5-9-3	Operations	Compliant	27-Feb-2020	
171	Vehicular Traffic	Controllers use prescribed procedures and phraseology regarding the movement of vehicular traffic	7110.65 par 3-1-3d; 3-1-5; 3-7-6; 3-7-1b	Operations	Compliant	27-Feb-2020	
174	VFR-on-Top	Controllers use standard procedures and phraseology for applying VFR-on-top	7110.65 par 7-3-1; 7-3-2 and 9-3-3	Operations	Compliant	27-Feb-2020	

175	Visibility Chart Developed/Maintained/Marked	Visibility charts are available (as needed) to meet required elements of prescribed procedures	7210.3 par 2-9-6	Operations	Compliant	27-Feb-2020	
176	Visual Approaches	Controllers use standard procedures and phraseology for applying Visual Approaches	7110.65 ch 7 sec 4	Operations	Compliant	27-Feb-2020	
177	Visual Scanning	Controllers visually scan runways on a continuous basis	7110.65 3-1-12	Operations	Compliant	27-Feb-2020	
178	Visual Separation	Controllers use standard procedures and phraseology for the application of visual separation	7110.65 par 7-2-1a and c	Operations	Not Observed	27-Feb-2020	
ECV Rating Text The ECV Team was unable to observe this item during the visit. Posted by Henry P Nagy on 13-Feb-2020							
179	Wake Turbulence	Controllers apply standard separation and advisories for flights impacted by wake turbulence	7110.65 par 2-1-19; 2-1-20 and 5-5-4e; N JO 7110.582	Operations	Compliant	27-Feb-2020	
184	Weather Familiarization	Controllers/Specialists become familiar with pertinent weather information when coming on duty, and stay aware of current weather information needed to perform ATC duties	7110.65 par 2-6-1	Operations	Noncompliant - Low	28-Feb-2020	
ECV Rating Text TUL uses a paper document to record the completion of the CWSU briefing. Two controllers for each ECV day did not complete Pre-Duty Weather Briefing prior to working a control position. Posted by Henry P Nagy on 27-Feb-2020							

186	Weather Processing	Receipt and dissemination of weather products	7110.65 par 2-9-2b; 7210.3 par 2-9-2; 2-9-4; 2-9-9 and 10-3-1	Operations	Compliant	27-Feb-2020	
187	Weather/Chaff Services	Controllers use correct procedures and phraseology for reporting weather and chaff information to pilots and other affected facilities	7110.65 par 2-6-4	Operations	Not Observed	27-Feb-2020	
ECV Rating Text The ECV Team was unable to observe this item during the visit. Posted by Henry P Nagy on 13-Feb-2020							

ICV Checklist for TUL - Tulsa Intl (Combined Tower/TRACON)
CVT Year: 2022
Date of most recent ECV: 10-Feb-2020 - 27-Feb-2020
127 of 127 items

id	Item	Description	Reference	Evaluation Area	ICV Rating	ICV Approval	Mitigation Plan?
2	Abbreviated Transmissions	Controllers use standard abbreviated transmissions phraseology	7110.65 par 2-4-9	Operations	Unrated		
359	Air Traffic Control Operational Contingency Plans	Air Traffic Managers are responsible to have Operations Contingency Plans (OCPs) in place to respond to events that affect the Operational Contingency Levels (OCLs) of their facility to provide ATC services. Reference: FAA JO 1900.47 Air Traffic Control Operational Contingency Plans a. Ensure that the OCP conforms to the current version of the FAA JO 1900.47 Chapter 3, Documentation. b. Complete the annual requirements by December 31 of each calendar year. 1. Ensure that all network support agreements have been reviewed 2. Ensure that a facility ATC Zero exercise is conducted unless an actual ATC Zero or ATC Limited event occurred during the year.	1900.47 Ch 2 Section J; Ch 5 Section C	Operations	Unrated		

		3. Ensure certification of the facility OCP and support procedures in the National OCP Database. 4. Ensure certification of contact information in OCPs in the National OCP Database. c. Ensure the facility has conducted refresher training on the OCP in accordance with FAA JO 3120.4 Air Traffic Technical Training, which includes: 1. Airspace divestment/assumption procedures 2. Use of CPSS information, where applicable 3. Operationally relevant information seen during an exercise or event.					
8	Airport Conditions	Controllers provide timely information regarding landing area conditions using prescribed phraseology	7110.65 ch 3 sec 3; par 4-7-12b and c	Operations	Unrated		
9	Airport Construction	Facility management follow applicable requirements when dealing with airport construction	7210.3 par 10-3-12 and 10-3-13	Operations	Unrated		
10	Airport De-icing Plans	Facility implements local airport de-icing plans	7210.3 par 10-1-12	Operations	Unrated		
11	Altimeter Issued and Requirements	Altimeter issued in accordance with prescribed procedures	7110.65 Ch 2 Sec 7; 7210.3 par 2-10-3 and 2-10-4	Operations	Compliant	05-Apr-2022	

13	Altitude Assignment and Verification	Controllers apply standardized application of procedures, assigning and verifying altitudes and standard phraseology	7110.65 ch 4 sec 5	Operations	Compliant	Pending	
14	Altitude Filter Limits	Mode C targets and data blocks are displayed correctly through the use of appropriate altitude limits and display filters	7110.65 par 5-2-24	Operations	Compliant	05-Apr-2022	
15	Anticipating Separation	Takeoff or landing clearances need not be withheld until prescribed separation exists	7110.65 par 3-9-5 and 3-10-6	Operations	Unrated		
16	AOV Credentialing	All requirements for conducting and recording initial credential ratings and biennial skill evaluations and completing return to duty plans are followed	8000.90	Administrative	Compliant	05-Apr-2022	
18	Approach Information and Arrival Procedures - Instructions	Controllers provide radar frequency, beacon changes, and advance approach information	7110.65 par 4-7-1	Operations	Compliant	05-Apr-2022	
19	Approach Separation Minima	Controllers adhere to separation minima for approach procedures	7110.65 par 5-9-5	Operations	Compliant	05-Apr-2022	
20	Arrival and Approach Information and TCP	Controllers provide arrival and approach information and execute TCP	7110.65 par 4-7-10 and 4-7-11	Operations	Compliant	05-Apr-2022	
21	Arrival Procedures	Controllers meet required elements and phraseology requirements	7110.65 ch 3 sec 10; ch 4 sec 7; par 5-9-4 and 5-9-5	Operations	Compliant	05-Apr-2022	

22	Arrival Weather, Airport Conditions	Controllers provide and solicit weather information, airport conditions, and below minima reports as required	7110.65 par 4-7-7; 4-7-11 and 4-7-12a	Operations	Compliant	05-Apr-2022	
23	ASDE/Safety Logic Systems	Controllers use ASDE/Safety Logic Systems and take appropriate actions when alerts are issued	7110.65 ch 3 sec 6; 7210.3 ch 12 sec 8	Operations	Unrated		
25	ATIS Procedures	ATIS duties including content, code broadcast and review	7110.65 ch 2 sec 9	Operations	Compliant	05-Apr-2022	
26	Automated Information Transfer (AIT)	AIT is conducted under the proper conditions	7110.65 par 5-4-8	Operations	Unrated		
288	Backup/Augmentation of Weather Observations	a. Facilities where air traffic personnel provide backup/augmentation of automated weather observations, or take manual observations, must use FAAO 7900.5, Surface Weather Observing METAR, as the basic source of guidance for completion of observations. b. In an automated weather environment, elements of automated weather observations may be used for operational purposes (i.e., wind and altimeter). c. Specialists responsible for providing backup/ augmentation of automated weather observations, or manual observations, must	JO7210.3; para 2-9-1	Operations	Unrated		

		be certified by the National Weather Service (NWS).					
28	Battery Transceivers	Back-ups are checked once a week	7210.3 par 3-3-5	Operations	Unrated		
29	Beacon Systems	Controllers use standardized procedures and phraseology related to beacon systems	7110.65 par 5-2-1 through 5-2-16 and 5-2-22	Operations	Compliant	05-Apr-2022	
30	Bird Hazard Procedures/Advisories	Controllers issue bird activity advisories using prescribed phraseology. Required notifications are accomplished.	7110.65 par 2-1-23	Operations	Unrated		
32	Call Sign Usage	Aircraft identification and similar sounding call signs are handled as required	7110.65 par 2-4-15 and 2-4-20	Operations	Compliant	05-Apr-2022	
33	Class B/C/D Airspace Operations	Controllers provide Class B/C/D services and phraseology	7110.65 par 3-1-11; ch 7 sec 7 through 9	Operations	Unrated		
34	Clearances	Controllers use standardized manual and automated clearance formats and phraseology	7110.65 ch 4 sec 2 and 4; par 4-3-4	Operations	Compliant	05-Apr-2022	
35	Coded Departure Routes (CDR)	CDRs are developed, updated, and coordinated as required	7210.3 ch 18 sec 18	Operations	Unrated		
40	Coordinate Use of Airspace	Controllers ensure necessary coordination is accomplished	7110.65 par 2-1-14 and 2-1-16	Operations	Unrated		
41	Coordinating Delays	Controllers meet requirements for forwarding delays and coordinating departure clearances	7110.65 par 4-3-7 through 4-3-10	Operations	Compliant	05-Apr-2022	

42	Covered Event Reviews (CER)	CERs are conducted as directed and are completed in accordance with applicable directive	7210.634 par 3-4	Quality Control	Compliant	05-Apr-2022	
43	CTO Certification	Facility has a designated CTO examiner. Certificates are issued. CTO certificates are readily available	8000.90	Administrative	Unrated		
44	Data Blocks	Controllers display and retain data blocks as required	7110.65 par 5-3-9a and 5-15-8	Operations	Compliant	05-Apr-2022	
46	Data Entries/Display Data	Use of scratch pad entries, system information, select/inhibit switches	7110.65 par 5-15-5; 7210.3 par 3-9-1	Operations	Compliant	05-Apr-2022	
48	Delay Reporting	Facility reports delays as required	7210.3 par 18-5-12; 7210.55G	Operations	Compliant	05-Apr-2022	
49	Delays	Controllers use standard procedures and phraseology associated with departure delays, releases, ground stops, and delay sequencing	7110.65 par 4-3-4 through 4-3-7	Operations	Compliant	05-Apr-2022	
50	Density Altitude Broadcast	Controllers/Specialists broadcast density altitude on the appropriate frequencies, as required	7210.3 par 2-10-6	Operations	Unrated		
51	Departure Procedures	Controllers meet required elements and phraseology requirements	7110.65 ch 3 sec 9; ch 4 sec. 3; ch 5 sec 8	Operations	Compliant	05-Apr-2022	
52	Emergency Frequencies	Facility ensures emergency frequencies are monitored continuously, in working order, and checked regularly	7210.3 par 3-3-3 and 3-3-4	Operations	Compliant	05-Apr-2022	

53	Emergency Procedures	Requirements are met for providing services in/to an emergency in accordance w/ prescribed procedures	7110.65 ch 10 sec 1 and 2	Operations	Unrated		
59	Flight Check Handling	Controllers use standard flight check handling procedures	7110.65 ch 9 sec 1	Operations	Compliant	05-Apr-2022	
62	GENOT Handling	Ensure that all employees with a need to know are thoroughly briefed prior to performing duties	7210.3 par 2-2-8	Operations	Compliant	05-Apr-2022	
66	Hazardous Weather Broadcast Procedures and Phraseology	Controllers/Specialists use correct procedures and phraseology for HIWAS broadcast	7110.65 par 2-6-6	Operations	Unrated		
65	Helicopter Operations	Controllers apply standard procedures (including locally developed) and phraseology	7110.65 ch 3 sec 11	Operations	Compliant	05-Apr-2022	
67	Inflight Equipment Malfunctions	Controllers properly follow procedures for inflight equipment malfunctions	7110.65 par 2-1-7	Operations	Compliant	05-Apr-2022	
68	Interphone Format	Standard format is used on interphone	7110.65 par 2-4-8 through 2-4-14	Operations	Compliant	31-Mar-2022	
ICV Rating Text This item met the 90% standard at the end of the monitoring period. We met requirements 95% of the time. Posted by Todd A Biggs on 29-Mar-2022							
69	Interphone, Frequency Monitoring and Testing	Controllers/Specialists monitor interphones and radio frequencies continuously (to include emergency frequencies when required)	7110.65 par 2-4-2; 7210.3 par 3-3-3 and 3-3-4 (check for emergency frequency testing)	Operations	Compliant	05-Apr-2022	

70	Intersecting Runway Separation	Controllers apply standard separation during intersecting runway operations	7110.65 par 3-9-8 and 3-10-4	Operations	Compliant	05-Apr-2022	
71	Intersection Departures	Intersection departure procedures are applied as required	7110.65 par 3-7-1c; d and e; 7210.3 par 2-1-13	Operations	Compliant	05-Apr-2022	
72	LAHSO	Controllers apply procedures in accordance with directives and standard phraseology is used	7110.65 par 3-10-4b; 7210.3 par 10-3-7	Operations	Unrated		
73	Line Up and Wait (LUAW)	Controllers use proper phraseology and procedures and traffic is exchanged as required	7110.65 par 3-9-4; 3-10-5b and c; 3-10-6b; 7210.3 par 2-6-5c and 10-3-8	Operations	Not Observed	05-Apr-2022	
ICV Rating Text LUAW is no longer authorized at TUL. Posted by Todd A Biggs on 18-Jan-2022							
74	Local/Ground Coordination	Controllers ensure coordination is completed and phraseology was correct	7110.65 3-1-3 and 3-1-4; 7210.3BB 3-4-1	Operations	Compliant	05-Apr-2022	
75	Low Level Wind Shear/Microburst Advisories	Using prescribed phraseology, controllers provide wind shear and microburst advisories as reported by equipment and/or pilots	7110.65 par 3-1-8; 7210.3 par 2-10-1a and b	Operations	Unrated		
78	Memory Aids	Facility implements their directive that clearly defines coordination responsibilities and safeguards to prevent	7210.3 par 10-1-7	Operations	Compliant	05-Apr-2022	

		inadvertent use of runways					
79	Merging Target Procedures	Controllers apply merging target procedures as required	7110.65 par 5-1-8	Operations	Compliant	05-Apr-2022	
83	Mode C Validation	Controllers use prescribed phraseology for assigning and verifying altitudes	7110.65 par 5-2-18 through 5-2-22	Operations	Compliant	05-Apr-2022	
84	MSAW/Conflict/MCI Alert	Controllers take appropriate action with E-MSAW, conflict alert, and MCI requirements when a CA or MCI alert is displayed	7110.65 par 5-15-6 and 5-15-7	Operations	Compliant	05-Apr-2022	
85	Multiple Instrument Approach Procedures	Controllers use prescribed procedures and phraseology when providing multiple instrument approach service ? Controllers provided a minimum of 1,000 feet vertical or a minimum of 3 miles radar separation between aircraft during turn on to final approach course ? Controllers provided a minimum of 1.5 miles radar separation diagonally between successive aircraft on adjacent localizer/azimuth courses when runway centerlines were at least 2,500 feet but no more than 4,300 feet apart	7110.65 par 5-9-6 through 5-9-9; 7110.98	Operations	Unrated		

229	Multiple Runway Crossings	Facilities obtain administrative approval to conduct multiple runway crossing and operationally conduct multiple runway crossings in accordance with requirements.	7210.3 paragraph 10-3-11 and 7110.65 paragraph 3-7-2 c	Operations	Unrated		
87	National Traffic Management Log (NTML)	Required information is entered into the NTML	7210.3 par 18-5-3 through 18-5-4	Operations	Unrated		
88	NAVAID Monitoring Directive and Application	Monitoring instructions are included in a facility directive and restoration and reporting NAVAID malfunctions are in accordance with local national requirements	7210.3 par 3-5-1	Operations	Unrated		
89	Nonradar Procedures	Controllers apply nonradar procedures as required	7110.65 ch 6; sec 2-1	Operations	Unrated		
90	NORDO/NORAC Aircraft	Proper procedures regarding NORDO/NORAC Aircraft are followed	7110.65 par 10-4-4; 7610.4 ch 7 sec 2 & 3	Operations	Compliant	05-Apr-2022	
93	NOTAM Distribution	Personnel adhere to standardized distribution of received NOTAM information to other ATC facilities	7210.3 par 6-3-2 and para 6-3-4d3; 7930.2 par 3-1-2a; 3-2-1; and 3-2-2	Operations	Compliant	05-Apr-2022	
95	NOTAM Handling	NOTAMs are included on checklists and status information areas and briefed to personnel	7210.3 6-3-4d.3; 7930.2 par 1-3-1a and b; 2-2-3; 3-2-1 and 3-2-2	Operations	Compliant	05-Apr-2022	

106	OJTI Selection, Certification and Evaluation	OJTIs are selected certified and evaluated in accordance with National Directive	3120.4; Ch 6	Training	Compliant	05-Apr-2022	
107	Operational Currency	Operational and staff personnel maintain currency as required	7210.3 Ch 2; Section 3	Operations	Compliant	05-Apr-2022	
108	Operational Oversight	FLM/CIC/OS monitors operation, anticipates traffic flow, manages and eliminates distractions, and takes appropriate actions	7210.3 par 2-6-1; 2-6-2; 2-6-5a; 2-6-6; 5-1-2b and 5-3-7e	Operations	Compliant	05-Apr-2022	
373	Operational Reference Material	Information areas, position binders, etc., are current and accurate.	FAAO 7210.3 paragraph 2-1-3 and 2-1-4	Operations	Compliant	05-Apr-2022	
109	Operations Plan	Develop, manage and implement a daily strategic plan for air traffic operations in the NAS	7210.3 ch 18 sec 20	Operations	Compliant	05-Apr-2022	
287	Opposite Direction Operations (ODO)	Description: The facility has developed procedures that have been approved by the service area Director Of Operations (through the Operations Support Group). The facility has captured those procedures in a local directive. The facility complies with those procedures.	7210.3 par. 2-1-34; ATO-SG-15-7 ODO	Operations	Unrated		
110	Overdue Aircraft	Controllers gather and share information on overdue aircraft and properly complete applicable control actions	7110.65 par 10-3-1; 10-3-2; 10-3-6 and 10-4-1 through 10-4-3	Operations	Unrated		

116	PIREP Information	Controllers solicit, broadcast, and disseminate PIREPs, as required, using prescribed phraseology	7110.65 par 2-6-2	Operations	Unrated		
117	Point Out Procedures	Controllers use point out procedures and phraseology either manually or via an automated method, as required	7110.65 par 5-4-2c; 5-4-3 and 5-4-7	Operations	Compliant	05-Apr-2022	
118	Position Certification Process	Facilities follow established requirements and procedures for OJT and position certification process	3120.4; Chapter 6	Training	Unrated		
119	Position Determination	Determine position of aircraft prior to issuing instructions or clearance	7110.65 par 3-1-7	Operations	Unrated		
120	Position Relief Briefings	Controllers/Specialists ensure position briefings are completed and recorded, and checklists are used	7110.65 Appendix A; 7210.3 par 2-2-4 and 2-2-6	Operations	Compliant	31-Mar-2022	
ICV Rating Text This item met the 90% standard at the end of the monitoring period. Controllers met requirements 100% of the time. Posted by Todd A Biggs on 29-Mar-2022							
121	Position Staffing	Assign personnel to positions as required by activity, equipment, and facility function	7210.3 ch 2 sec 6	Operations	Compliant	05-Apr-2022	
122	Prearranged Coordination	Specialists comply with the prearranged coordination procedures that have been established and published in a facility directive/LOA	7110.65 par 5-3-9b; 5-4-9 and 5-15-4e	Operations	Compliant	05-Apr-2022	

123	Precision Approach Critical Areas/ Precision Obstacle Free Zones	Precision Approach Critical Areas and Precision Obstacle Free Zones are described, depicted, and protected, when required	7110.65 par 3-3-7; 3-7-5 and 3-7-6	Operations	Unrated		
127	Qualification Training	All required employees receive field qualification training IAW National and Local Directives	3120.4 par 4-2 and app D; F; G and H	Training	Compliant	05-Apr-2022	
128	Quality Control Monitoring	Quality Control Operational Skill assessments (QCOSA) are performed in accordance with applicable directive and include identified emphasis items (EI) as required	7210.634 ch 3	Quality Control	Compliant	05-Apr-2022	
129	Quality Control Programs	Quality Control Checks (QCC) and Quality Control Validations (QCV) are completed as required	7210.634 ch 6	Quality Control	Compliant	05-Apr-2022	
130	Radar Alignment Check	Controllers check radar alignment during position briefing or shortly after assuming position	7110.65 par 5-1-2	Operations	Compliant	05-Apr-2022	
131	Radar Handoff Procedures	Controllers use specified radar handoff phraseology and procedures	7110.65 par 2-1-15; 5-4-1 and 5-4-3 through 5-4-6	Operations	Compliant	05-Apr-2022	
132	Radar Identification Methods	Controllers use specified radar identification procedures and phraseology	7110.65 par 5-3-2 through 5-3-7	Operations	Compliant	05-Apr-2022	
133	Radar Termination	Controllers apply standard radar termination procedures and phraseology	7110.65 par 5-1-13	Operations	Compliant	05-Apr-2022	

134	Radar Vectoring	Controllers use standard radar vectoring procedures and phraseology	7110.65 ch 5 sec 6	Operations	Compliant	05-Apr-2022	
135	Radio Communication	Controllers/Specialists use standard radio transmission format and phraseology and apply correct readback/hearback procedures and phraseology	7110.65 par 2-1-17; 2-4-3; 2-4-8 and 2-4-14 through 2-4-22	Operations	Compliant	05-Apr-2022	
136	Refresher Training	Each facility must establish and comply with a written annual refresher training program	3120.4 Ch 4 par 5b and Appendix A	Training	Compliant	05-Apr-2022	
137	Remedial Training	Remedial Training is administered in accordance with National Directive	3120.4 Ch 4 par 6	Training	Unrated		
138	Runway Exiting	Controllers use prescribed procedures, including those in a local directive, for aircraft exiting runways	7110.65 par 3-10-9	Operations	Compliant	05-Apr-2022	
139	Runway Utilization	Controllers apply standardized procedures and phraseology to arrival and departures using the runways	7110.65 ch 3 sec 5 and 8; par 3-7-1c through e; 7210.3 par 10-1-6	Operations	Compliant	05-Apr-2022	
140	RVR Issuance	Controllers issue runway visual range, when required	7110.65 par 2-8-1 through 2-8-3	Operations	Unrated		
142	Safety Alerts	Controllers apply safety alert requirements and phraseology	7110.65 par 2-1-6	Operations	Compliant	05-Apr-2022	
144	Same Runway Separation	Controllers apply standard separation on same runway operations	7110.65 par 3-9-6 and 3-10-3	Operations	Compliant	05-Apr-2022	

146	Severe Weather	Facility TMUs coordinate directly with the ATCSCC for matters pertaining to severe weather	7210.3 ch 18 sec 14 and 15	Operations	Unrated		
147	Skill Enhancement Training	Skill enhancement training meets required elements of prescribed procedures	3120.4 Ch 4; Section 5d	Training	Unrated		
268	SOP/LOA Reviews	Review LOAs/SOPs for accuracy and completeness of data annually and as needed.	7210.3 paras 2-1-2; 2-1-3; 2-1-4; 2-1-5; 2-1-6; 2-2-14; 3-3-2; 4-3-3;4-3-5; 4-3-6	Operations	Compliant	05-Apr-2022	
148	Special Flight Handling	Standard procedures are followed when handling Special Flights	7110.65	Operations	Unrated		
149	Special Traffic Management Programs (STMP)	Requirements are met when implementing special procedures for events	7210.3 ch 18 sec 14	Operations	Unrated		
150	Special Use Airspace Procedures	Controllers use standard special use airspace procedures: separation standards, clearance in and out, and VFR-on-top	7110.65 ch 9 sec 3	Operations	Unrated		
151	Special VFR	Controllers use standard procedures and phraseology for Special VFR operations	7110.65 ch 7 sec 5	Operations	Unrated		
152	Speed Adjustments	Controllers use standard speed control application, methods, minima, and phraseology	7110.65 ch 5 sec 7	Operations	Compliant	05-Apr-2022	

153	Strip Marking	Controllers use standard flight progress strip marking	7110.65 par 2-3-1; 2-3-4 and 2-3-5 through 2-3-10	Operations	Compliant	05-Apr-2022	
154	Supplemental Duties	Supplemental duties are performed as required	7210.3 ch 18 sec 4	Operations	Unrated		
155	Supplemental Training	Training provided prior to effective date of new/revised procedures, regulations or equipment, etc.	3120.4 Ch 4 par 5C and Appendix A	Training	Unrated		
156	System Service Review (SSR)	SSRs are conducted and documented as required and events were documented and closed	7210.634 ch 4	Quality Control	Unrated		Has Plan
157	Systemic Issue Reviews (SYSIR)	SYSIRs are conducted when issues that have potential system impact have been identified and are completed in accordance with applicable directive	7210.634 par 4-5	Quality Control	Unrated		
158	Taxi/Ground Movement Procedures	Controllers provide clearance instructions using prescribed procedures and phraseology	7110.65 par 3-7-1 through 3-7-4; 7210.3 par 10-3-11; AC 120-57A	Operations	Compliant	31-Mar-2022	
ICV Rating Text This item met the 90% standard at the end of the monitoring period. Controllers met requirements 91% of the time. Posted by Todd A Biggs on 29-Mar-2022							
159	TCAS/TAWS	Controllers handle TCAS/TAWS resolution advisories and reporting as required	7110.65 par 2-1-28	Operations	Unrated		

161	Terminal Inter-Facility Coordination	Coordination between TMUs is accomplished as required	7210.3 Ch 18 Section 5	Operations	Unrated		
162	TM Responsibilities of FLM/CIC and ATCS	FLM/CICs and ATCSs work to manage flows of traffic as required	7110.65 par 11-1-2b and c	Operations	Unrated		
163	Tower Radar Displays	Use of tower radar displays	7110.65 par 3-1-9; 7210.3 par 10-5-3	Operations	Compliant	05-Apr-2022	
164	Traffic Advisories	Controllers apply traffic advisories as required	7110.65 par 2-1-21	Operations	Compliant	31-Mar-2022	
ICV Rating Text This item met the 90% standard at the end of the monitoring period. Controllers met requirements 100% of the time. Posted by Todd A Biggs on 29-Mar-2022							
165	Traffic Management Duties and Responsibilities	TMUs are in compliance with applicable standard operating procedures	7110.65 par 11-1-2; 7210.3 par 18-2-4a and c	Operations	Not Observed	05-Apr-2022	
ICV Rating Text TUL does not have a TMU unit. Posted by Todd A Biggs on 18-Jan-2022							
166	Traffic Management Initiatives (TMIs)	System capacity and traffic demands are evaluated and initiatives are implemented as necessary	7210.3 par 18-7	Operations	Unrated		
167	Traffic Management Reviews (TMR)	TMRs are conducted as applicable in order to identify issues that may impact system efficiency	7210.634 par 4-3	Quality Control	Unrated		
170	Vectoring to Final Approach	Aircraft were vectored to the final approach course to intercept at the applicable point using proper procedures and phraseology	7110.65 par 5-9-1 through 5-9-3	Operations	Compliant	05-Apr-2022	

171	Vehicular Traffic	Controllers use prescribed procedures and phraseology regarding the movement of vehicular traffic	7110.65 par 3-1-3d; 3-1-5; 3-7-6; 3-7-1b	Operations	Compliant	31-Mar-2022	
ICV Rating Text This item met the 90% standard at the end of the monitoring period. Controllers met requirements 100% of the time. Posted by Todd A Biggs on 29-Mar-2022							
174	VFR-on-Top	Controllers use standard procedures and phraseology for applying VFR-on-top	7110.65 par 7-3-1; 7-3-2 and 9-3-3	Operations	Unrated		
175	Visibility Chart Developed/Maintained/Marked	Visibility charts are available (as needed) to meet required elements of prescribed procedures	7210.3 par 2-9-6	Operations	Compliant	05-Apr-2022	
176	Visual Approaches	Controllers use standard procedures and phraseology for applying Visual Approaches	7110.65 ch 7 sec 4	Operations	Compliant	05-Apr-2022	
177	Visual Scanning	Controllers visually scan runways on a continuous basis	7110.65 3-1-12	Operations	Compliant	31-Mar-2022	
ICV Rating Text This item met the 90% standard at the end of the monitoring period. Controllers met requirements 100% of the time. Posted by Todd A Biggs on 29-Mar-2022							
178	Visual Separation	Controllers use standard procedures and phraseology for the application of visual separation	7110.65 par 7-2-1a and c	Operations	Unrated		
179	Wake Turbulence	Controllers apply standard separation and advisories for flights impacted by wake turbulence	7110.65 par 2-1-19; 2-1-20 and 5-5-4e; N JO 7110.582	Operations	Compliant	05-Apr-2022	

184	Weather Familiarization	Controllers/Specialists become familiar with pertinent weather information when coming on duty, and stay aware of current weather information needed to perform ATC duties	7110.65 par 2-6-1	Operations	Unrated		
186	Weather Processing	Receipt and dissemination of weather products	7110.65 par 2-9-2b; 7210.3 par 2-9-2; 2-9-4; 2-9-9 and 10-3-1	Operations	Unrated		
187	Weather/Chaff Services	Controllers use correct procedures and phraseology for reporting weather and chaff information to pilots and other affected facilities	7110.65 par 2-6-4	Operations	Unrated		

NOTICE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

TULSA INTERNATIONAL ATCT/TRACON

N 7220.120

Effective Date:
MAR 31, 2022
Cancellation Date:
MAR 30, 2023

SUBJ: Adding Procedures for CTAF and Filing NOTAM's

1. **PURPOSE:** This Notice amends TUL Order 7220.1K, adding procedures for Operational Risk Management (ORM).

2. **AUDIENCE:** All TUL ATCT personnel.

3. **EFFECTIVE DATE:** MARCH 31, 2022

4. **PROCEDURES:** Amend TUL Order 7220.1K as follows:

   1. Add paragraph 1-2-24 a, b, c, d and e to Chapter 1 Section 2. General.

      1-2-24 OPERATIONAL RISK MANAGEMENT (ORM)

      a. The continuance of a safe flow of air traffic and required services is essential during emergency conditions, as is the safety of personnel, property and support of other agencies. Procedures for ensuring air traffic service continuity and building security are found in the Tulsa Facility Security Plan (TUL FSP) and in the Automated Contingency Tool (ACT 2).

      b. The Air Traffic Manager (ATM), or designee, will serve as the Air Traffic Operational Risk Management Plan (ORPM) approver. ORPM reviewers may be an Operations Supervisor, Support Specialist or a Certified Controller-In-Charge.

      c. The union facility representative, or designee, are authorized reviewers for ORMP's.

      d. ORMP team members will comprise of, at a minimum, one member from management and one union member. Other stakeholders may be added as reviewers for informational and increased situational awareness.

      e. Any ORMP document produced by a project implementer must be reviewed by the team members prior to commencing the ORMP.

Josh Rogers,
Air Traffic Manager
Tulsa International ATCT/TRACON

Distribution: TUL ATCT, Federal Directives Repository

Initiated By: TUL-ATM

NOTICE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

TULSA INTERNATIONAL ATCT/TRACON

N 7220.119

Effective Date:
MAR 2, 2022
Cancellation Date:
MAR 1, 2023

SUBJ: Adding Procedures for CTAF and Filing NOTAM's

1. **PURPOSE:** This Notice amends TUL Order 7220.1K, adding procedures for tower closures / evacuations by adding procedures for CTAF on the ATIS and filing NOTAM's with the AFSS.

2. **AUDIENCE:** All TUL ATCT personnel.

3. **EFFECTIVE DATE:** MARCH 2, 2022

4. **PROCEDURES:** Amend TUL Order 7220.1K as follows:

   1. Add paragraph 4-2-1 w to Chapter 4, Section 2, TRACON FLM/CIC.
   In the event that TUL ATCT cannot provide ATC services to airport users due to an equipment malfunction, or tower evacuation, local control frequency 121.2 will be designated as the common traffic advisory frequency (CTAF). The CTAF will be added too and broadcast on the ATIS. A NOTAM will be filed with the Automated Flight Service Station (AFSS) by calling 1-877-487-6867 on the tower closure. If TUL ATCT is unable to provide class C services the information will be added too and broadcast on the ATIS. A NOTAM will be filed with the AFSS.

   Examples NOTAMS:

   - TUL TWR CLSD TWR 121.2 NOW CTAF (must have a beginning & end times)
   - ZKC TUL APP U/S CLASS C SERVICE NOT AVBL CTC KANSAS CITY ARTCC ON 127.8 (must have a beginning & end times)

[redacted]
Josh Rogers,
Air Traffic Manager
Tulsa International ATCT/TRACON

Distribution: TUL ATCT, Federal Directives Repository

Initiated By: TUL-ATM

NOTICE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

TULSA INTERNATIONAL ATCT/TRACON

N 7220.116

Effective Date:
NOV 15, 2021
Cancellation Date:
NOV 14, 2022

SUBJ: Amend Procedure for Recording Local Traffic Count

1. **PURPOSE:** This Notice amends TUL Order 7220.1K, amending procedures for entering traffic count and removing from 4-1-1 Tower FLM/CIC Duties and 4-2-1 TRACON FLM/CIC Duties.

2. **AUDIENCE:** All TUL ATCT personnel.

3. **EFFECTIVE DATE:** November 15, 2021

4. **PROCEDURES:** Amend TUL Order 7220.1K as follows:

    1. Amend 2-4-8 c to read: "Ensure local tower traffic count operations are entered into the Count Ops website hourly."

    2. Remove 4-1-1 g.

    3. Remove 4-2-1 r.

    4. Remove Appendix J.

[redacted]

Josh Rogers,
Air Traffic Manager
Tulsa International ATCT/TRACON

Distribution: TUL ATCT, Federal Directives Repository

Initiated By: TUL-ATM

NOTICE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

TULSA INTERNATIONAL ATCT/TRACON

N 7220.115

Effective Date:
NOV 8, 2021
Cancellation Date:
NOV 7, 2022

SUBJ: Remove LUAW from the LCE and LCW Checklists

1. **PURPOSE:** This Notice amends TUL Order 7220.1K, removing LINE UP AND WAIT (LUAW) from the Local Control East (LCE) and West (LCW) checklists.

2. **AUDIENCE:** All TUL ATCT personnel.

3. **EFFECTIVE DATE:** November 8, 2021

4. **PROCEDURES:** Amend TUL Order 7220.1K as follows:

    1. Remove checklist item 6 Line Up and Wait (LUAW), from the Local Control East and West checklist in Appendix B-1 of order 7220.1K.

    2. Amend the checklist in the IDS4 and at the LCE and LCW positions.

[redacted]

Josh Rogers,
Air Traffic Manager
Tulsa International ATCT/TRACON

Distribution: TUL ATCT, Federal Directives Repository

Initiated By: TUL-ATM

NOTICE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

TULSA INTERNATIONAL ATCT/TRACON

N 7220.114

Effective Date:
AUG 2, 2021
Cancellation Date:
AUG. 1, 2022

SUBJ: LUAW NO LONGER AUTHORIZED

1. **PURPOSE:** This Notice amends TUL Order 7220.1K removing procedures LINE UP AND WAIT (LUAW).

2. **AUDIENCE:** All TUL ATCT personnel.

3. **EFFECTIVE DATE:** August 2, 2021

4. **PROCEDURES:** Amend TUL Order 7220.1K as follows:

   1. Remove 2-4-12 Line Up and Wait (LUAW), from Section 4. Local Control in the Table of Contents:

   2. Remove chapter 2-4-12 LINE UP AND WAIT (LUAW) from Section 4 of the order.

[redacted]
Josh Rogers,
Air Traffic Manager
Tulsa International ATCT/TRACON

Distribution: TUL ATCT, Federal Directives Repository

Initiated By: TUL-ATM

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Chapter 1. GENERAL

Section 1. INTRODUCTION

1-1-1. PURPOSE OF THIS ORDER

This order prescribes air traffic control procedures, phraseology, delegation of airspace, and position responsibilities, for use by persons providing air traffic control services at Tulsa International TRACON/Air Traffic Control Tower (TUL).

1-1-2. AUDIENCE

This order is distributed to all TUL Tower personnel.

1-1-3. WHERE CAN I FIND THIS ORDER?

You can find this order in the facility Orders Binder and the Federal Directives Repository: https://loa.faa.gov

1-1-4. CANCELLATION

TUL ATCT Order 7220.1J, Standard Operating Procedures, dated April 22, 2019, all changes and notices to it are canceled.

1-1-5. EXPLANATION OF MAJOR CHANGES

This change cancels and implements all previous Notices.

1-1-6. EFFECTIVE DATE

This order is effective March 11, 2021.

Section 2. GENERAL

1-2-1. TOWER CAB AND TRACON LAYOUT

Position layout of the Tower Cab and TRACON are depicted in Appendix A.

1-2-2. FREQUENCIES, POSITIONS AND POSITION IDENTIFIERS

Position Name	Position ID	VHF	UHF
Tower Cab FLM/CIC	TS/CIC		
Flight Data	FD		
Clearance Delivery	CD	134.05	284.7
Ground Control	GC	121.9	348.6
Local Control East	LCE	121.2	310.8
Local Control West	LCW	118.7	257.8
Tower Cab Coordinator	CC		
TRACON FLM/CIC	FLM/CIC		
Radar Data	RD		
Radar West	RW	124.0	338.3
Radar Coordinator West	RCW		
Radar East	RE	119.1	351.8
Radar Coordinator East	RCE		
Radar Final	RF	132.1	239.275
ASR	ASR	125.775	270.275
Radar Coordinator Finals	RCF		
Radar Satellite West	RSW	134.7	
Radar Satellite East	RSE	119.85	
Radar Coordinator Satellite	RCS		
Radar Overhead Coordinator	ROC		

TBL 1-2-1

NOTE-
Frequency 263.0 is available for single frequency approach operations and must be monitored by RW when not in use.

1-2-3. DUTY FAMILIARIZATION AND THE TRANSFER OF POSITION RESPONSIBILITY

Prior to working a position, all personnel must receive and acknowledge a daily pre-duty weather briefing being shown on one of the sign-in/off computers. Acknowledge receipt of the weather briefing by initialing the line next to your name, and entering the current time that the briefing was received. All positions at TUL, including supervisory positions, require position familiarization. Position relief briefings must be conducted utilizing the position relief checklist located on the IDS-4, (see Appendix B), in accordance with FAA JO 7110.65, or laminated checklist cards in the Tower. The following procedures must be followed:

a. Position relief briefings must be recorded using the "BRF" button on the ETVS.

b. The relieved controller must monitor and observe the control position for at least two (2) minutes after completing the position relief briefing to verify that all pertinent information has been transferred, all traffic situations have been communicated and understood, and all conflicts have been resolved. TRACON monitoring must be accomplished at the coordinator position serving that position. LCE and GC monitoring must be accomplished at the CC position. FD/CD monitoring must be accomplished at the FD position.

c. After completion of the minimum two (2) minute monitoring session, the relieved controller must select the "BRF" button and state their operating initials followed by the phrase "monitor complete", then de-select the "BRF" button. Example: "RR, monitor complete."

d. Position relief briefings may not take place simultaneously at positions of operations that are identified as critically dependent. The following positions have been identified as critically dependent and simultaneous position relief briefings are not allowed with each pair listed:

1. Local Control East and Ground Control
2. Radar West and Radar East
3. Radar Satellite West and Radar Satellite East

e. Position relief briefings may begin on a position of operation identified as critically dependent only after a position relief briefing on another critically dependent position has been completed.

f. To ensure immediate and continuous override capabilities during position relief briefings, the relieving CPC must plug into the control position. The CPC being relieved must remain plugged into the position until the position relief briefing in completed.

g. Relieving/Relieved developmentals must conduct the position relief briefing from an adjacent position as described below:

1. Radar Position: Associated Coordinator Position
2. LC/GC: CC Position
3. CD: FD Position

Developmentals must call the position being relieved, from the above position, to conduct the position relief briefing.

1-2-4. INTERPHONE COORDINATION

Operational communications must be recorded to the maximum extent practicable as written in FAA JO 7210.3. All opposite direction approaches and all full stop landings or straight through climbouts to non-advertised runways must be verbally coordinated.

1-2-5. STARS COORDINATION

a. A standard format of up to three (3) characters will be used for non-verbal coordination of all TUL arrivals between control positions. The standard format for scratch pad 1 entries will be:

1. First letter – Approach

2. Second letter – Runway Assignment

3. Third letter – Missed approach/climb-out issued (Absence of 3rd character means full stop)

b. Scratch pad 1 useable entries for arrivals:

	APPROACH			RUNWAY			MA/CLIMBOUT
V	Visual/VFR		L	18L/36L		E	Radar East
I	ILS		R	36R/18R		W	Radar West
G	GPS/RNAV		C	8 / 26		H	Home West
T	TACAN/VOR		P	Lunar Pad		X	Home East
O	Overhead					N	Finals (towards RE)
S	SFO					G	Finals (towards RW)
A	ASR					B	RVS
H	High Tac-Initial					T	Tower Pattern
						P	Lunar Pad

TBL 1-2-2

c. Non-verbal coordination for Missed Approach/Climb-out assignments are listed below (See TBL 1-2-3 through TBL 1-2-14).

1. All military fixed-wing aircraft must be issued the missed approach/climb-out for Jets.

2. The frequency assigned to the aircraft will be indicated by the control symbol on the aircraft's full data block.

3. "B" only applies to VFR props departing Tower's airspace going into Riverside Tower's airspace. Tower may revise the heading if necessary.

4. All props including helicopters except those described in paragraph c. 1. above, will be issued 2,500'.

	RWY 18L/18R FLOW	
	PROPS	JETS
E	HDG 130	RH – 4,000’ (RE – stay)
W	HDG 230	RH – 4,000’ (RW – stay)
X		RH – Assigned Alt. (RE - leave)
H		RH – Assigned Alt.(RW - leave)
N	HDG 050	
G	HDG 310	
B	HDG 210	

TBL 1-2-3

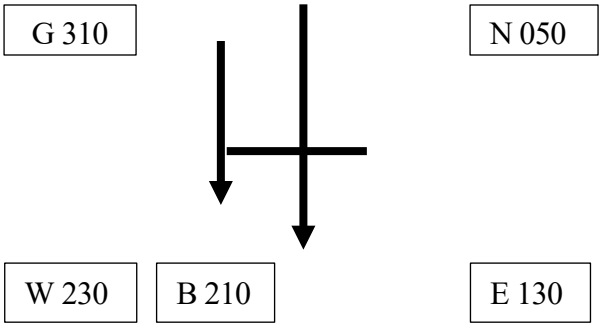


FIG 1-2-1

	RWY 36R/36L FLOW	
	PROPS	JETS
E	HDG 050	RH – 4,000’ (RE – stay)
W	HDG 310	RH – 4,000’ (RW – stay)
X		RH – Assigned Alt. (RE - leave)
H		RH – Assigned Alt.(RW - leave)
N	HDG 130	
G	HDG 230	

TBL 1-2-4

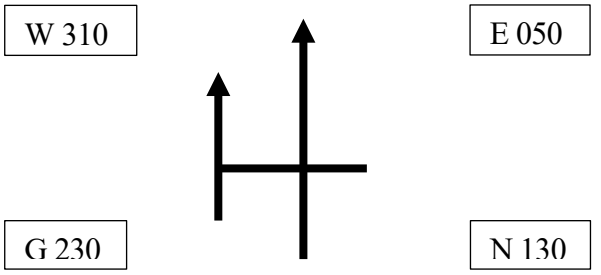


FIG 1-2-2

	RWY 8 FLOW	
	PROPS	JETS
E	HDG 050	RH – 4,000’ (RE – stay)
W	HDG 130	RH – 4,000’ (RW – stay)
X		RH – Assigned Alt. (RE - leave)
H		RH – Assigned Alt.(RW - leave)
N	HDG 310	
G	HDG 210	

TBL 1-2-5

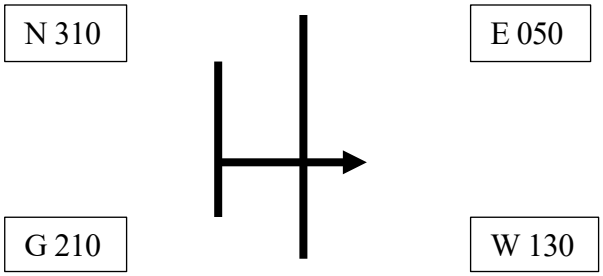


FIG 1-2-3

	RWY 26 FLOW	
	PROPS	JETS
E	HDG 310	RH – 4,000’ (RE – stay)
W	HDG 230	RH – 4,000’ (RW – stay)
X		RH – Assigned Alt. (RE - leave)
H		RH – Assigned Alt.(RW - leave)
N	HDG 030	
G	HDG 130	
B	HDG 210	

TBL 1-2-6

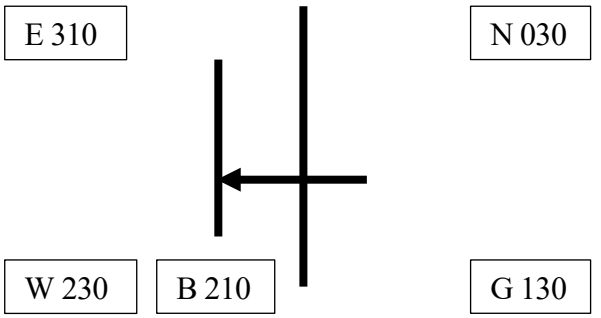


FIG 1-2-4

	RWY 8/18R FLOW	
	PROPS	JETS
E	HDG 050	RH – 4,000’ (RE – stay)
W	HDG 130	RH – 4,000’ (RW – stay)
X		RH – Assigned Alt. (RE - leave)
H		RH – Assigned Alt.(RW - leave)
G	HDG 210	
B	HDG 210	

TBL 1-2-7

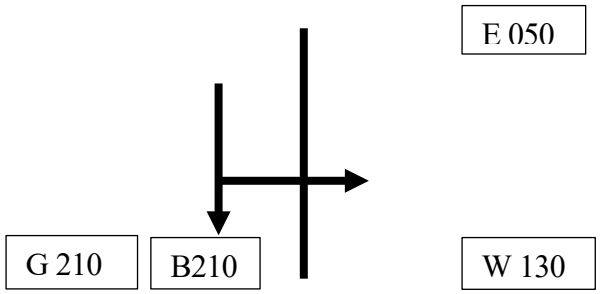


FIG 1-2-5

	RWY 8/36L FLOW	
	PROPS	JETS
E	HDG 050	RH – 4,000’ (RE – stay)
W	HDG 130	RH – 4,000’ (RW – stay)
X		RH – Assigned Alt. (RE - leave)
H		RH – Assigned Alt.(RW- leave)
N	HDG 310	

TBL 1-2-8

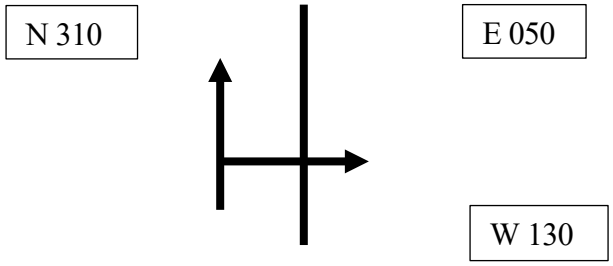


FIG 1-2-6

	RWY 26/18R FLOW	
	PROPS	JETS
E	HDG 310	RH – 4,000’ (RE – stay)
W	HDG 230	RH – 4,000’ (RW – stay)
X		RH – Assigned Alt. (RE - leave)
H		RH – Assigned Alt.(RW - leave)
G	HDG 130	
B	HDG 210	

TBL 1-2-9

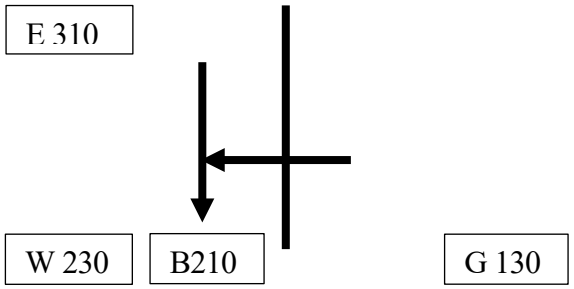


FIG 1-2-7

	RWY 26/36L FLOW	
	PROPS	JETS
E	HDG 310	RH – 4,000’ (RE – stay)
W	HDG 230	RH – 4,000’ (RW – stay)
X		RH – Assigned Alt. (RE - leave)
H		RH – Assigned Alt.(RW - leave)
N	HDG 030	

TBL 1-2-10

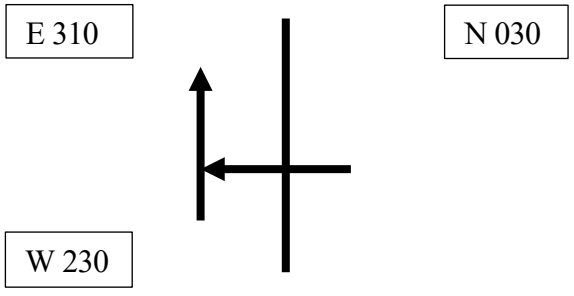


FIG 1-2-8

	RWY 36R/26 FLOW	
	PROPS	JETS
E	HDG 030	RH – 4,000’ (RE – stay)
W	HDG 310	RH – 4,000’ (RW – stay)
X		RH – Assigned Alt. (RE - leave)
H		RH – Assigned Alt.(RW - leave)
G	HDG 230	

TBL 1-2-11

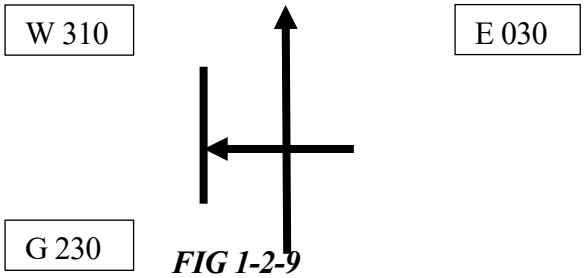


FIG 1-2-9

	RWY 36R/8 FLOW	
	PROPS	JETS
E	HDG 050	RH – 4,000’ (RE – stay)
W	HDG 310	RH – 4,000’ (RW – stay)
X		RH – Assigned Alt. (RE - leave)
H		RH – Assigned Alt.(RW - leave)
N	HDG 130	

TBL 1-2-12

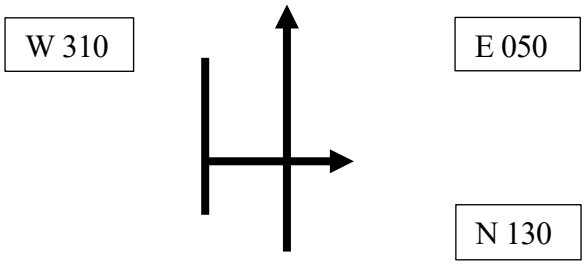


FIG 1-2-10

	RWY 18L/8 FLOW	
	PROPS	JETS
E	HDG 130	RH – 4,000’ (RE – stay)
W	HDG 210	RH – 4,000’ (RW – stay)
X		RH – Assigned Alt. (RE - leave)
H		RH – Assigned Alt.(RW - leave)
N	HDG 050	
B	HDG 210	

TBL 1-2-13

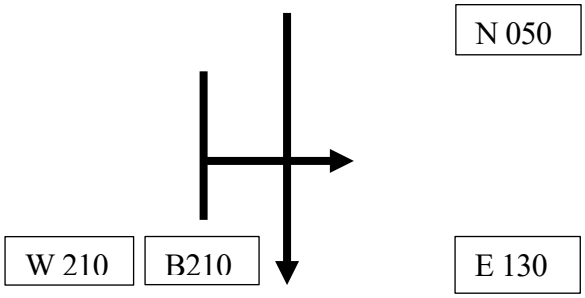


FIG 1-2-11

	RWY 18L/26 FLOW	
	PROPS	JETS
E	HDG 130	RH – 4,000’ (RE – stay)
W	HDG 230	RH – 4,000’ (RW – stay)
X		RH – Assigned Alt. (RE - leave)
H		RH – Assigned Alt.(RW - leave)
G	HDG 310	
B	HDG 210	

TBL 1-2-14

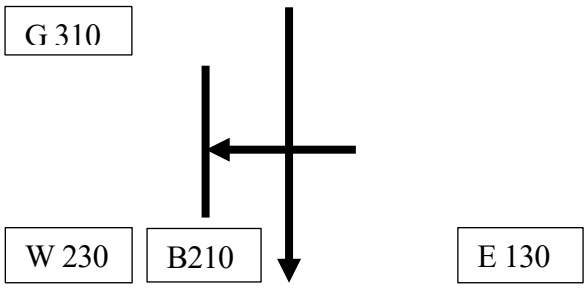


FIG 1-2-12

d. Scratch Pad 2 entries are only required for coordination with RVS Tower. Their meanings are separate from this directive and can be found in the TUL/RVS LOA. Scratch Pad 2 entries are optional elsewhere, if used the definitions for TUL Arrivals are as follows:

ILS	Request ILS Apch next		RVS	Req. go to RVS VFR next
VOR	Request VOR Apch next		RIL	Req. RVS ILS next
GPS	Request GPS Apch next		DME	Req. RVS VOR DME A next
ASR	Request ASR Apch next		RGP	Req. RVS GPS next
HTA	Request High TACAN/VOR Apch next		GPR	A/C conducting/descending on RNAV 19R Apch to RVS
VFR	No Apch clearance has been issued & only VFR sep. is being applied		CAD	Cross over top of TUL, above Tower airspace & descend on course on the other side (VFR only)
	For Future Use			*For Future Use*

TBL 1-2-10

e. Scratch Pad 1 or 2 entries may consist of any ICAO 3-letter designator, direction of flight, or locally approved entries. Locally approved scratch pad 1 or 2 entries are listed in TBL 1-2-11.

SKI	Skiatook		STJ	St. John's	JFA	Just flying around
POG	Sand Springs Pogue		SCH	Hillcrest South	AP	Apache Dep.
GUN	Gundy's		STF	St. Francis	CL	Claremore Dep.
VIN	Vinita		OSU	OK St. Med. Cntr.	MI	Mingo Dep.
			HLC	Hillcrest	MH	Mohawk Dep.
KEY	Keystone		SFH	St. Francis South	BA	Broken Arrow Dep.
WAG	Wagoner		CLR	Claremore Regional	PPL	Pipeline
HKL	Haskell		SFB	St. Francis BA	VS	Visually separated
SAM	Sam Riggs		SJO	St. John's Owasso	VF	Visually following
PJA/JMP	Skydiving		SJB	St. John's BA	RTN	Routine Patrol
DTN	Downtown Tulsa		BMC	Bailey - Owasso	LTS	Light Tours

TBL 1-2-11

1-2-6. PREARRANGED COORDINATION PROCEDURES (P-ACP)

a. A Prearranged Coordination procedure describes the process by which one controller must allow an aircraft to enter or transit another's airspace in a manner which assures standard separation without individual coordination for each aircraft. Prearranged coordination procedures must be accomplished in accordance with FAA JO 7110.65, Paragraph 5-4-9 and FAA JO 7210.3, Paragraph 3-7-4. Tulsa Primary and Secondary Radar and STARS FSL must be operational in order for P-ACP to be applied. In the event P-ACP is not practicable, each controller must remain within the confines of their own airspace and verbally coordinate prior to entering another controller's airspace.

1. The Mode C altitude may be used for vertical separation purposes during P-ACP without verbal coordination if used in accordance with paragraph 1-2-7.f.

2. Two positions of operation are not authorized to enter each other's airspace simultaneously at the same location.

3. Controllers must not climb an arriving aircraft or descend a departing aircraft within P-ACP without verbal coordination with those positions responsible for separation from those aircraft.

4. Controllers who enter another controller's airspace using P-ACP must ensure their display intensities are set so as to indicate, at a minimum, the position symbol, altitude information, and aircraft category identifiers on partial data blocks.

5. Controllers must determine whether the lead aircraft is a heavy or B757 when separating aircraft operating behind, or directly behind and less than 1,000'. The equipment suffix depicted on a partial data block may be used for this purpose.

b. Overflight P-ACP:

1. RW/RE may apply P-ACP within the shaded boundaries of LCE/W airspace, depicted in FIG 1-2-1, for VFR traffic watch, police, air ambulance and/or light tour helicopters at or below 2,000' as long as the helicopter does not cross the extended centerline for the parallel runways within 3 miles south of TUL.

c. Departure P-ACP:

1. RW/RE may apply P-ACP with departures off TUL Runways 18R/18L and TUL Runways 36R/36L (as depicted in FIG 1-2-2), for aircraft assigned runway heading provided:

(a) RW issues a turn of at least 15 degrees into RW airspace as soon as the aircraft leaves 2,500'.

(b) RE issues a turn of at least 15 degrees into RE airspace as soon as the aircraft leaves 2,500'.

(c) Verbal coordination must be accomplished if, departures are not issued a turn leaving 2,500', when aircraft do not auto-acquire, and on non-transponder equipped aircraft.

NOTE-
In the event prearranged coordination becomes impractical for any reason, automatic releases will be canceled and RE must be responsible for providing departure releases.

d. Arrival/Departure P-ACP:

1. RW/RE may apply P-ACP within the shaded boundaries of RF airspace, as depicted in FIG 1-2-3 thru 1-2-6, with IFR prop departures/go around traffic during crossing runway operations provided:

(a) RW/RE must **not** issue turns further towards RF airspace than assigned by the tower.

(b) RW/RE must ensure RF is advised of any untracked targets within the P-ACP airspace.

(c) RF must be responsible for maintaining approved separation between aircraft under their control and all P-ACP aircraft.

NOTE-
In the event prearranged coordination becomes impractical for any reason, RW/E cancels automatic prop releases on headings that effect RF airspace.

FIG 1-2-1
Overflight P-ACP

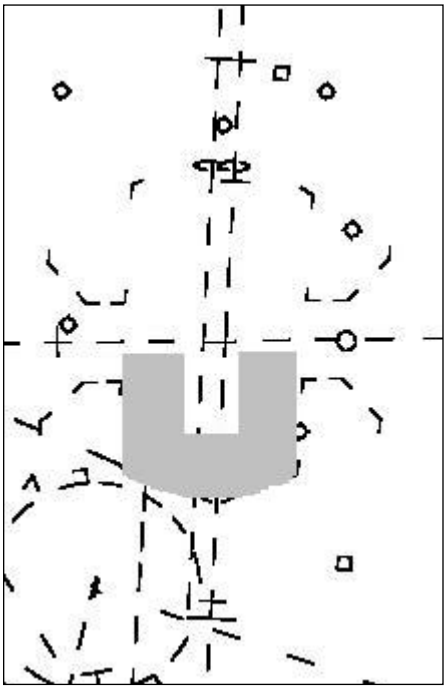


FIG 1-2-2
Departure P-ACP

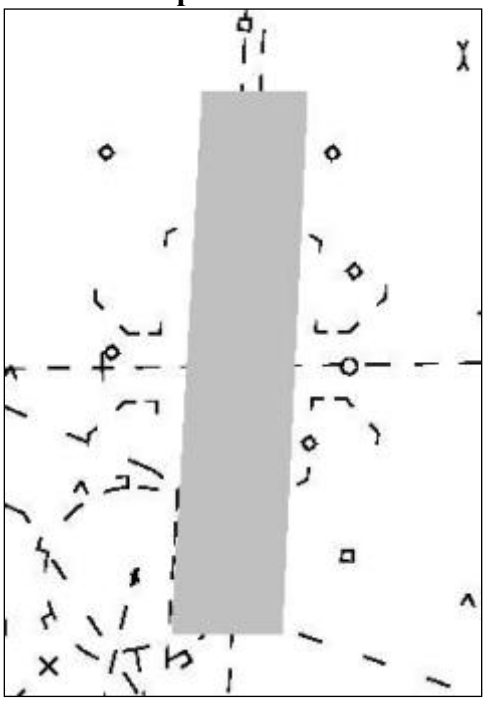


FIG 1-2-3
Arrival P-ACP RWY 8/18

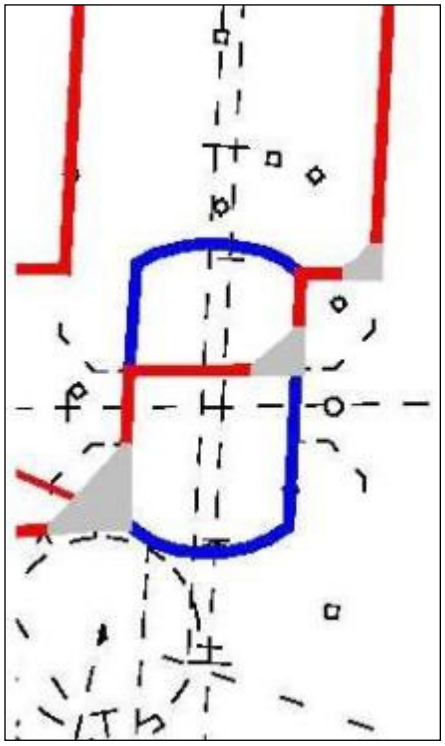


FIG 1-2-4
Arrival P-ACP RWY 26/18

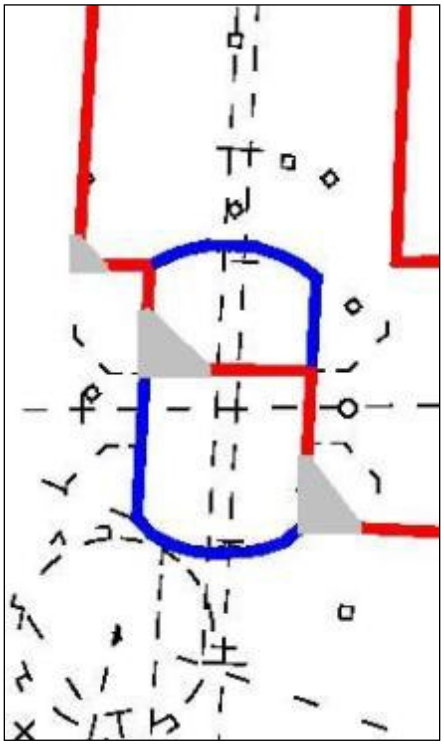


FIG 1-2-5
Arrival P-ACP RWY 8/36

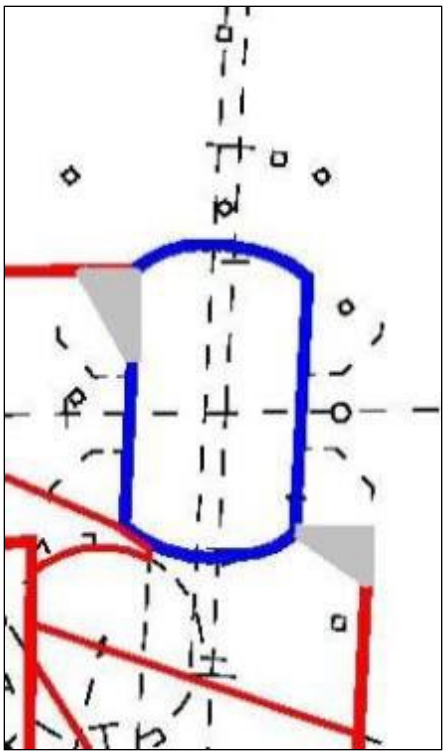
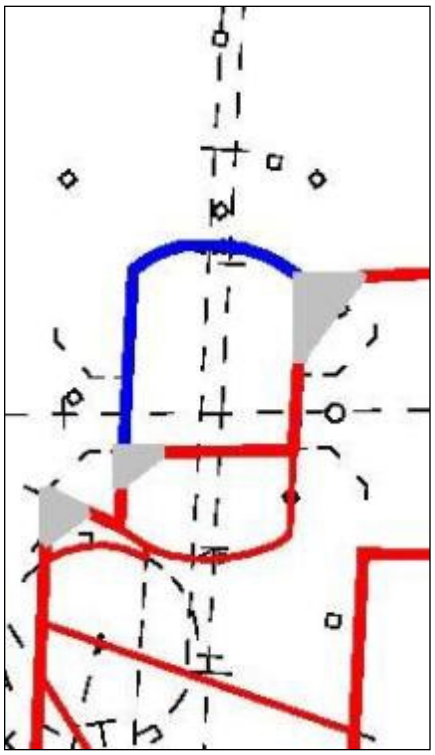


FIG 1-2-6
Arrival P-ACP RWY 26/36



1-2-7. AUTOMATED POINTOUT (APO) PROCEDURES

Transfer of radar identification must be accomplished in accordance with FAA JO 7110.65, Chapter 5, Section 4. When utilizing Automated Point Out procedures, heading, speed, and altitude information does not need to be transferred between TUL TRACON positions provided the STARS data block contains the appropriate scratch pad information and the type aircraft. Local Control and all TRACON positions may initiate and accept Automated Point Outs as follows:

a. Prior to initiating an Automated Point Out, the transferring controller must ensure the STARS data block contains, the appropriate scratch pad information from paragraph 1-2-5, the type aircraft, and assigned altitude (+<ALT><SLEW>), if requesting to climb or descend aircraft after pointout. The transferring controller must initiate an Automated Point Out by entering: "(position/keyboard ID) ASTERISK <SLEW>". Example: T*<SLEW>. This will cause a yellow full data block to flash on the receiving controller's display with the characters "PO" located after the aircraft ID.

b. The receiving controller may accept the Automated Point Out by entering "<SLEW>" on the full data block. The characters "PO" will be erased, and the yellow full data block will remain displayed on the receiving controllers display with the transferring controller's position symbol. Prior to accepting an Automated Point Out, the receiving controller must verbally issue restrictions to the transferring controller to provide separation from other aircraft within his/her area of jurisdiction.

c. The receiving controller may accept an Automated Hand Off instead of a Point Out by entering 2 Asterisks (**) and "<SLEW>" on the flashing full data block. This will change the Point Out to a Hand Off by changing the position symbol to the receiving controller and flashing the full data block on the transferring controller's display. The full data block on the receiving controller's display will change to white.

NOTE-
The Automated Point Out function can only be initiated for aircraft on the transferring controller's position symbol. This function is not available for aircraft on a different position symbol or aircraft handed off to another position.

d. The receiving controller may reject an Automated Point Out by entering <UN> and "<SLEW>" on the full data block. At the position receiving the Point Out the data block will return to a partial data block. At the transferring controller's position the "PO" text will turn to a flashing "UN".

e. Once the receiving controller has approved an Automated Point Out, the transferring controller must direct the aircraft on a route toward the destination depicted in the scratch pad. The transferring controller is authorized to climb the departure or descend the arrival within the receiving controller's airspace as provided below:

1. To the assigned altitude in Assigned Altitude Field, or

2. In accordance with scratch pad entry as defined in 1-2-5 d.

The transferring controller must not climb a previously descended aircraft or descend a previously climbed aircraft without verbally informing the receiving controller. The transferring controller must verbally inform the receiving controller of any changes in the aircraft route or altitude from that depicted in the data block scratch pad at the time of the Automated Point Out.

f. The Mode C altitude may be used for vertical separation purposes during an Automated Point Out without verbal coordination provided:

1. STARS FSL single site mode is in use.

2. Assign an altitude to an aircraft only after the aircraft previously at that altitude is observed at or passing through another altitude separated by 1,000 feet or more.

NOTE-
This will ensure appropriate separation is maintained if the point out aircraft or P-ACP aircraft is encountering severe turbulence, conducting military aerial refueling, or has been issued a climb/descent at pilot's discretion.

3. Controllers must not issue a cruise clearance or contact approach to an aircraft prior to notifying those positions responsible for separation from the aircraft. Do not use the Mode C altitude for vertical separation purposes with an aircraft on a cruise clearance or contact approach.

1-2-8. AUTOMATED INFORMATION TRANSFER (AIT)

In addition to the procedures outlined in this handbook, the transfer of radar identification may be utilized according to the following procedures and restrictions:

a. Procedures.

1. Controller A initiates a transfer of radar identification to Controller B.

2. Before the aircraft enters Controller B's airspace, he/she accepts the transfer of radar identification and, traffic permitting, initiates a transfer of radar identification to Controller C.

3. After observing that Controller C has accepted the transfer of radar identification, Controller A transfers communications to Controller C before the aircraft enters Controller C's airspace.

EXAMPLE-
The following procedure is established for implementation under the AIT process and is agreed to by the Radar West, Radar East or Radar Finals sectors and Radar Satellite East/West.

Radar West initiates a transfer of radar identification to Radar Satellite East/West.

Radar Satellite East/West, traffic permitting, modifies the Position Control Symbol to a "J" tag prior to the aircraft entering Radar Satellite East/West's airspace.

Radar West is authorized to proceed direct to the RVS airport and descend the aircraft to appropriate traffic pattern altitude to comply with the TUL/RVS LOA for appropriate entry in to RVS traffic pattern.

Radar West must transfer radio communications to RVS ATCT in accordance with the TUL/RVS LOA.

b. Restrictions.

1. The initiating Controller A has the option of transferring communications to intermediary positions involved in this procedure.

2. Each controller is responsible for separation and coordination within his/her airspace.

3. The initiating Controller A must be responsible for correct altitude assignments for entry into airspace of successive positions involved in this procedure.

4. All equipment associated with the automatic transfer of radar identification must be fully operational.

NOTE-
These AIT procedures may only be used by TUL personnel. These procedures may only be used for operations conducted into RVS airport. There is no other operational change to any other Letter of Agreement or coordination procedures with any other ATC facility.

1-2-9. AIRCRAFT IDENTIFICATION

a. VFR local call signs must be used in accordance with appropriate LOA's as follows:

Call sign	Telephony		Call sign	Telephony
ZU	Auto		LFLT	Lifeflight
LFTM	Lifeteam		POLC	Police
NEWS	News		FFLT	FirstFlight

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b. Local OK-AANG (LUNAR or GHOST) helicopters may be abbreviated as LUN.

1-2-10. MODE 3/A BEACON CODES

Beacon code subsets allotted to TUL for VFR aircraft are not subject to MSAW alarms. Those subsets are: 0301-0377 and 0201-0276. IFR beacon code subsets for TUL are 4340-4377. Special use beacon codes are listed in TBL 1-2-13.

BC	Call sign	Name/Company		BC	Call sign	Name/Company
0377	LFLT1	Lifeflight		0276	LFTM131	Lifeteam
0376	LFLT2	Lifeflight		0277	LFTM135	Lifeteam
O363	LFLT3	Lifeflight		0364	NEWS6	KOTV Channel 6
0360	LFLT4	Lifeflight		0365	AIRC1	AirCare
0356	LFLT5	Lifeflight		0366	ZU02	Auto Pilot Central
0271	LFTM04	Lifeteam		0370	ZU01	Auto Pilot Central
0272	LFTM26	Lifeteam		0371	POLC1	Tulsa Police
0375	LFTM29	Lifeteam		0372	POLC2	Tulsa Police
0357	LFTM36	Lifeteam		0367	FFLT1	FirstFlight
0273	LFTM70	Lifeteam				
0362	LFTM83	Lifeteam		0373	TWRE	VFR with LCE
0274	LTM128	Lifeteam		0374	TWRW	VFR with LCW
0275	LFTM129	Lifeteam				

TBL 1-2-13

1-2-11. RUNWAY USAGE

a. Selecting Active Runways.

1. The active runways shall be those advertised on the ATIS.

2. When active runways are either 18L/R or 36R/L, and unless weather or safety is a factor, departing jets should not be turned off runway heading until leaving 2,500'. This also applies to opposite directions operations.

3. The Tower FLM/CIC must determine which runways are to be designated as active runways.

4. Due to noise sensitive areas surrounding Tulsa International, Runway 18L/R must be the ATIS advertised runways when:

(a) The wind at TUL is less than 5 knots. For operational purposes, the official wind comes from the tower Surface Weather System (SWS). The ASOS wind is solely for weather reporting and Backup for the SWS.

(b) The Tower FLM/CIC may deviate from this only if it is operationally advantageous, the approach end of Runway 18L is displaced, any portion of the ILS for Runway 18L is OTS, or weather is a factor.

b. During a crossing runway operation at TUL, the primary runway will be the longest active runway for arrivals and departures. The secondary runway will be the shortest active runway. The primary runway is the preferred runway for jets and all military fixed-wing props due to informal noise abatement.

1-2-12. HELICOPTER OPERATIONS

a. Helicopter operations are authorized on all designated movement areas.

b. The Lunar Pad is an auto rotation lane for Army National Guard helicopters and is on airport property.

1-2-13. CLASS C AIRSPACE INTRUSIONS

Controllers should maintain a constant vigilance of the Class C airspace for unauthorized aircraft.

a. If an unauthorized intrusion of the Class C airspace is observed or reported, controllers must immediately advise the TRACON FLM/CIC, and:

1. Track the target using the facility identification plus number if appropriate, i.e. TUL, TUL2.

2. Note time and location of intrusion and identify the aircraft if possible.

3. If the aircraft is identified and communications established, advise the pilot to call Tulsa Tower as soon as possible.

b. If the unidentified target is entering another facility's airspace, the controller must:

1. Hand-off the target as an unidentified aircraft and advise the receiving controller that the aircraft identification is needed.

2. Advise the receiving controller to have the pilot call Tulsa Tower as soon as possible if communication is established.

3. Advise the watch supervisor that the aircraft has been handed-off to another facility.

c. The watch supervisor must take appropriate action in accordance with FAA JO 7210.3.

1-2-14. WEATHER INFORMATION

a. Contract WX Office hourly observations and special observations are received via ASOS and will be used as the airport weather on the ATIS broadcast. The outside phone line is the backup for ASOS. The Contract WX Office phone number is 832-7162.

b. Tower visibility observations are determined by the Local East controller and are distributed internally via the override or direct voice communications.

c. All positions must broadcast HIWAS alerts when any part of the area described is within 50 NM of TUL's airspace.

1-2-15. NOTAM's, NAS STATUS, FACILITY EQUIPMENT STATUS, AND SPECIAL ACTIVITIES

a. NOTAM's are normally received by the TRACON FLM/CIC, from the Tulsa Airport Improvement Trust and FTW AFSS via outside phone lines and dial lines. Other positions that receive NOTAM information must forward it to the TRACON FLM/CIC. Current and future NOTAM's are entered in the IDS-4 by the TRACON FLM/CIC on the NOTAM pages for TUL and Satellite Airports. Additionally, significant NOTAM's that affect the current operation are entered in the IDS-4 on the SIA page.

b. NAS Status and Special Activities are received via the FDIO, ETVS landline, or commercial telephone line.

c. Pertinent information dealing with equipment and NAVAID outages and special operations must be entered into the IDS-4 display system unless the outage is known to be short term. In the latter case, the affected positions must be notified.

1-2-16. STRIP MARKING PROCEDURES

When not specified in this directive, strip marking is optional, however, when used it must be accomplished in accordance with FAA JO 7110.65.

1-2-17. AIRCRAFT EMERGENCY PROCEDURES

a. The Tower FLM/CIC must be responsible for ensuring emergency alert notifications to CFR are made.

b. All positions of operations are responsible for advising supervisory personnel as soon as possible upon receipt of an emergency situation.

c. Alert notifications must be made in accordance with the TUL ATC Tower/TAIT Letter of Agreement, Emergency Notifications.

d. The CFR phone is the primary method for "Crash-Fire-Rescue" notification. Airport Police is the dispatching office. Other agencies on the circuit include Station 51, Air National Guard and EMSA.

1-2-18. RVS MIDSHIFT OPERATIONS

a. RVS Tower is closed between 10:00 PM and 7:00 AM. RVS Class D airspace reverts to Class G airspace. The RVS Opening/Closing Checklist located on the IDS-4 (see Appendix B) must be used when RVS coordinates opening and closing their operation.

b. When RVS is closed, TUL must monitor RVS Ground Control frequency 121.7 (Main Transmitter Only). This frequency is used for relaying IFR clearances and release times to aircraft on the ground at RVS and for receiving down times for IFR aircraft arriving RVS.

c. Requests for CFR Equipment for emergencies at RVS should be made through Tulsa Airport Improvement Trust at 838-5030 or through the TUL CFR phone. RVS Security can be contacted at 298-5214 to make ramp checks for overdue aircraft.

1-2-19. HANDLING PRESIDENTIAL AIRCRAFT

a. FLM/CIC must monitor presidential flights in accordance with FAA JO 7210.3.

b. FAA personnel must not release any information concerning presidential flights to anyone outside the FAA except properly identified White House staff members, Secret Service personnel, or appropriate military authorities.

c. Honor any request of the presidential aircraft pilot if it can be fulfilled in accordance with existing control procedures.

d. If rescue support aircraft are deemed necessary by the White House, the word "RESCUE" will be filed in the remarks section of the flight plan for purposes of radio and interphone communications.

1-2-20. SINGLE FREQUENCY APPROACH PROCEDURES

Single frequency approaches will be provided for the OK ANG aircraft in accordance with the LOA.

1-2-21. ESCAT – EMERGENCY SECURITY CONTROL OF AIR TRAFFIC

Pursuant to the Homeland Security Act of 2002, E.O. 12656, 13286, et al, Title 10 USC, and Title 49 USC, and FAA JO 7610.4M, Special Military Operations, the Air Traffic Control system Command Center (ATCSCC) must be notified by appropriate NORAD Sector of the implementation of ESCAT. The ATCSCC must notify the effected ARTCC's which will then impose restrictions on traffic as directed and disseminate ESCAT implementation instructions to ATC facilities as required. Such instructions may include, but not be limited to, the grounding

of all civil air traffic, the need for ESCAT Air Traffic Priority List (EATPL) implementation, and/or Security Control Authorization (SCA) requirement for flight in the affected area(s). TUL ATCT must proceed as directed in accordance with FAA JO 7610.4M, Ch. 6 ESCAT, and Appendix A. This order is classified "For Official Use Only" and is stored at the FLM desk.

1-2-22. OPPOSITE DIRECTION OPERATIONS

Opposite Direction Operations (ODO) Definition: IFR/VFR Operations conducted to the same or parallel runway where an aircraft is operating in a reciprocal direction of another aircraft arriving, departing, or conducting an approach.

a. General:

1. These procedures are applicable only when TUL TRACON is operational.

2. When the TUL ATCT's Certified Tower Radar Display (CTRD) is out of service, TUL TRACON will be responsible to ensure all (arrival and departure) cutoff points are met.

3. Local Control (LC) and the TRACON Radar positions share the responsibilities to coordinate ODO, and to issue traffic advisories as prescribed in this agreement.

4. LC is responsible to apply the cutoff points between arriving and departing aircraft in accordance with paragraph 12.

5. The TRACON controller responsible for issuing the approach clearance is responsible to apply the cutoff points between successive ODO arrivals in accordance with paragraph 12.

6. Do not allow ODO to the same runway with opposing traffic inside the cutoff point unless an emergency situation exists.

7. Traffic advisories must be issued to both aircraft.

Example: "Opposite Direction Traffic, B737, 12 mile final"

Example: "Opposite Direction Traffic, A319, departing runway 18L, turning westbound.

Example: "Opposite Direction Traffic, 12 miles southwest turning base, E135"

8. Use of visual separation is not authorized for aircraft receiving IFR services that are conducting ODO to the same runway.

9. Ensure the ODO conducted from parallel runways provide for a turn away from the opposing traffic when inside the cutoff point to the other runway. Once a turn away from opposing traffic, visual separation in authorized.

10. Mandatory Memory Aids:

(a) Local control must utilize the yellow-colored "ODO" strip holder until any opposite direction operation is complete.

(b) TRACON controllers must generate an untracked "ODO" tag on their scope until any opposite direction operation is complete.

11. Coordination:

(a) The initiating and approving control positions must advise the FLM/CIC in their respective operational areas prior to conducting opposite direction operations.

(b) Tower and TRACON are responsible for initiating coordination required to accomplish an opposite direction arrival or departure.

(c) Tower must verbally request opposite direction departures with TRACON.

(d) TRACON must verbally request opposite direction arrivals with Tower.

(e) Initial coordination must be on a recorded line and must state, *"OPPOSITE DIRECTIONS"* and include call sign, type and arrival or departure runway.

(f) All subsequent coordination must be on a recorded line and must state *"OPPOSITE DIRECTION"*.

12. ODO Cut-off Point procedures:

(a) For aircraft receiving IFR services (including VFR practice instrument approaches) and conducting same-runway ODO:

1) Departing aircraft must be airborne and established on a heading that diverges from the reciprocal final approach course by at least 45 degrees prior to an arriving aircraft reaching:

a) A point _10_ flying miles from the threshold of the runway of intended landing regardless of aircraft type, or

b) If an aircraft is established in the VFR traffic pattern, prior to that aircraft turning base leg.

2) An aircraft performing a go-around, low approach, or missed approach must be established on a heading that diverges from the reciprocal final approach course by at least 45 degrees prior to an arriving aircraft reaching:

a) A point _10_ flying miles from the threshold of the runway of intended landing regardless of aircraft type, or

b) If an aircraft is established in the VFR traffic pattern, prior to that aircraft turning base leg.

3) Arriving aircraft must cross the runway threshold prior to an opposite direction aircraft reaching:

a) A point _10_ flying miles from the threshold of the runway of intended landing regardless of aircraft type, or

b) If an aircraft is established in the VFR traffic pattern, prior to that aircraft turning base leg.

4) If the above conditions are not met, action must be taken to ensure control instructions are issued to protect the integrity of the cut off points.

(b) When conducting opposite direction operation with VFR/VFR or VFR/IFR aircraft:

1) If coordination with another position or facility is required, LC must state the phrase *"OPPOSITE DIRECTION"*.

2) Ensure VFR aircraft are issued a turn to avoid conflict with opposing IFR/VFR traffic.

3) When conducting opposite direction operations with VFR aircraft, LC must use the yellow-colored *"ODO"* memory aid.

4) LC must issue traffic to both aircraft and indicate the direction that the departure will turn (arrival/departure) or the location of the opposing aircraft on final (arrival/arrival).

1-2-23. COORDINATION OF VISUAL SEPARATION

a. General: If pilot-applied Visual Separation will be used and maintained as described below, this information must be passed, via one of the following intra-facility procedures, to the receiving controller prior to communications transfer:

1. STARS Scratch Pad 2 entries.

(a) VF – When wake turbulence separation is a factor, the aircraft has been cleared for a visual approach and instructed to follow the preceding aircraft.

(b) **VS** – Visual separation is being applied with the nearest preceding arrival aircraft on the adjacent final. Or, visual separation is being applied by the trailing departure aircraft to the preceding departure aircraft.

2. Verbal coordination.

3. Strip marking - Local may write **VS** in Block 9 of the flight progress strip of the trailing departure aircraft that is maintaining visual separation.

N. 7220.120

1-2-24 OPERATIONAL RISK MANAGEMENT (ORM)

a. The continuance of a safe flow of air traffic and required services is essential during emergency conditions, as is the safety of personnel, property and support of other agencies. Procedures for ensuring air traffic service continuity and building security are found in the Tulsa Facility Security Plan (TUL FSP) and in the Automated Contingency Tool (ACT 2).

b. The Air Traffic Manager (ATM), or designee, will serve as the Air Traffic Operational Risk Management Plan (ORPM) approver. ORPM reviewers may be an Operations Supervisor, Support Specialist or a Certified Controller-In-Charge.

c. The union facility representative, or designee, are authorized reviewers for ORMP's.

d. ORMP team members will comprise of, at a minimum, one member from management and one union member. Other stakeholders may be added as reviewers for informational and increased situational awareness.

e. Any ORMP document produced by a project implementer must be reviewed by the team members prior to commencing the ORMP.

Section 3. EQUIPMENT

1-3-1. BACKUP POWER GENERATORS

a. Airport Runway Lighting System Auxiliary Generator. This generator is to be utilized during CAT II operations and is operated by a switch located on the airport lighting panel. The generator is city owned and maintained and provides power to Runway 36R /18L edge lights, centerline and taxiway lead-off lights, touch down zone lights, and taxiways J, F, and G lights. Procedures for operating the generator are as follows:

1. **Start Up Sequence** for Day or Night Mode:

- Go to "Preset Page" (on Touch Screen)
- Select Visibility Setting; 1 To But Not Including 2 Miles; then "Confirm"
- Go to "Power Page"
- Click "START GEN", then "Confirm"
- Verify Switch-Over to Generator Power
- Return to "Preset Page" or "Runway Lighting Page" to select desired setting for light intensity.

2. **Shut Down Sequence** for Day or Night Mode:

- Go to "Preset Page"
- Select Visibility Setting' 1 To But Not Including 2 Miles', then "Confirm"
- Go to "Power Page"
- Click "STOP GEN", then "Confirm"
- "Generator Running" light will remain green for a while after shut-down
- Return to "Preset Page" or "Runway Lighting Page" to select desired setting for light intensity.

3. **NEVER START GENERATOR WITH LIGHTS IN THE HIGH STEP**

b. ALS RWY 36R Auxiliary Generator. This generator is to be utilized during CAT II operations and is operated from a panel located below the approach lights. The generator is maintained by Tech Ops (TO) and provides power to the RWY 36R approach lighting system and the ILS RWY 36R IM. Procedures for operating the generator are as follows:

1. ALS E/G Start Up

- Approach lights must be on
- ALSF Mode must be selected
- Brightness must be on Step 2
- Press "ON" button and hold until BOTH "E/G ON-LN" and "E/G RUNNING" LIGHT is illuminated

2. ALS E/G Shutdown

NOTE: It takes 20 minutes to return to commercial power after start-up

- Press "OFF" button and hold for 5 seconds
  "E/G ON-LN" and "E/G RUNNING" lights will remain on approximately 20 minutes Commercial Power is restored.
- When Commercial Power has been restored, "COMM AVAIL" and "COMM ON-LN" light will then illuminate
- Select desired approach light setting

c. ASR Auxiliary Generator. This generator is located at the ASR-9 Radar Site and provides backup power for the ASR-9 when commercial power is out. The generator is maintained by TO and is automatic in its operation.

d. Uninterrupted Power Source (UPS). Generators and batteries making up the UPS are located in the building immediately west of the TRACON. The batteries provide power during the period between commercial power failure and generator self-activation. The generators provide backup commercial power for air traffic critical equipment.

1-3-2. ASOS – AUTOMATED SURFACE OBSERVING SYSTEM

a. ASOS is a modular system, designed to automatically collect, process, and archive weather sensor measurement data. The individual weather parameter data monitored and processed by ASOS consists of: Sky condition; Visibility; Present weather type and intensity; Obstructions to vision; Pressure; Temperature and dew point; Wind; Precipitation Amount; and Freezing rain. Data are gathered from sensors located on the airport. The NWS provides an onsite Weather Observer located adjacent to the front office, in the main base building.

b. ASOS equipment is located in the Tower and consists of a monitor and keyboard. The monitor displays 1-Minute Observation Data, METAR/SPECI Messages, Auxiliary Data, and 5-Second Wind Updates. Additionally, a recording of the ASOS is available to the public at 918-831-6772.

c. Air Traffic personnel are required to be signed-on to the ASOS at all times. This prevents the system from going into "Auto" operations which do not allow a complete observation to be transmitted, should a power outage occur at the Contract Weather Office.

1. Sign-on Procedures:

- Press the **SIGN** key
- Enter user **INITIALS**
- Press the **RETURN** key
- Enter Password [**FAAMAN**]
- Press **RETURN** key

d. Air Traffic personnel utilize the ASOS equipment to transmit Tower Visibility Reports. Tower personnel are required to enter Tower Visibility when the reported or tower visibility is less than 4 miles. ASOS accepts 12 reportable visibility values, measured in statute miles. If necessary, round down to the nearest acceptable value. The reportable values are:
<1/41/4 1/2 3/4 1 1 1/4 1 1/2 1 3/4 2 2 1/2 3 4
The last tower visibility value entered remains in ASOS until it is removed or changed.

1. To Enter Tower Visibility:

   - Press the **TWR** key
   - Input the reportable visibility value
   - Press **EXIT** or the **RETURN** key

2. To Remove Tower Visibility:

   - Press the **TWR** key
   - Delete characters using the **REMOVE** key
   - Press the **EXIT** or the **RETURN** key

e. The area of observation which ASOS samples, is limited to the immediate vicinity in which the sensors are placed. This can sometimes result in a reading that is not representative of prevailing weather conditions. Under these circumstances, ASOS observations may need to be edited by the observer. Flight Data must advise the Contract Weather Observer when it is necessary to manually augment the observation.

f. If the ASOS observation appears to be grossly in error, advise the Tower FLM/CIC, who may then call the AOMC (ASOS Help Desk) to report such an occurrence. It will then be up to the AOMC and the Contract Weather Office to determine if the ASOS or some component will be considered out of service. (AOMC 1-800-242-8194, Contract Weather Office 6703).

g. If an aircraft mishap occurs, the TRACON FLM/CIC must call the Weather Observer and request a 2-hour archive for weather at the specific time the mishap occurred.

1-3-3. ITWS – INTEGRATED TERMINAL WEATHER SYSTEM

a. The primary mission of the ITWS is to enhance the safety of air travel through the timely processing and reporting of hazardous wind shear in and around the terminal approach and departure zones of the airport.

b. A secondary mission of the ITWS is to improve the efficient management of air traffic in the terminal area through the forecast of gust front-induced wind shifts, the detection of precipitation, and the tracking of storms.

c. The reporting of hazardous weather conditions is accomplished by generating the following weather products and alerts, and presenting them on the ITWS monitor.

- Microbursts and Microburst Alerts
- Wind Shear and Wind Shear Alerts
- Gust Fronts and Gust Front Alerts
- ASR precipitation with AP Alerts and Storm Cell Information
- Storm Motion/Extrapolated Position
- Terminal Text/Wind Profiles
- Tornado and Lightning Alerts
- Ribbon Display Alerts and Runway Configuration Information

d. There are two ITWS Situation Displays at TUL. One is located in the Tower, the other in the TRACON. Each Situation Display consists of a monitor, keyboard and trackball. Products available through ITWS along with a brief description of each, follows:

1. Microburst and Wind Shear. Microburst: Filled red circles with white numbering indicate potential airspeed loss in knots. Wind Shear: Open red circles with red numbering indicate potential airspeed loss in knots. Alerted runways and/or runway extensions are red.

2. Gust Front. Solid purple line indicates current location of gust front. Dashed purple lines indicate estimated location of gust front 10 and 20 minutes in the future. Purple arrow and number indicate direction and speed of wind behind the gust front.

3. Runway Configuration. Shows runway configuration in use and mapping of runways to lines on the ribbon display. To change runway configurations on the Ribbon Display at Ground Control, use the ITWS Situation Display and:

- Select RUNWAY
- Select INSTALL
- Select Runway Configuration
  - ◊ 36RL8-26
  - ◊ 18LR8-26
  - ◊ 36RL
  - ◊ 36RL-18LR
  - ◊ 18LR
  - ◊ 8-26

4. Ribbon Display Alerts. Shows runway configuration in use and ribbon display messages.

5. Terminal Wind. Table provides wind direction and speed at selected locations and altitudes.

6. ATIS Timers. Countdown timers that help manage ATIS messages. Buttons that are not gray and do not contain a number indicate there are active alerts. Buttons that are not gray and contain a number indicate that alerts have ended and the countdown timer is active.

7. Storm Cell Information. Indicates presence of hail, lightning, severe storm circulation, and an estimate of echo top.

8. Storm Motion and Storm Extrapolated Position. Storm Motion: Black arrow with black number indicates direction of motion and speed in knots of storm cell; Black square is speed less than 5 knots. Storm Extrapolated Position: Solid cyan line indicates leading edge of level 3 or greater weather. Dashed cyan lines indicate estimated location of level 3 or greater weather 10 and 20 minutes in the future.

9. Tornado. Detection: Open black circle containing inverted triangle indicates possible tornadic storm. Alert: Box turns black when there is the possibility that a tornadic storm is within 10 NM of the airport.

10. AP-Flagged Precipitation. Precipitation from individual ASR radars with AP shown in black. If operationally significant AP exists, the AP alert box turns black.

11. Lightning. Alert box turns yellow if cloud-to-ground lightning is detected within 20 NM of the airport.

12. Precipitation Products. Standard Mode. Precipitation displayed in the precipitation graphics window and as past and current weather images in the Forecast Loop window. Precipitation is represented by seven intensity levels. Winter Mode: Precipitation providing greater detail in light precipitation. Available as past and current weather images in Forecast Loop window only. Precipitation is denoted by nine intensity levels, with three lowest levels enhancing depictions of weak precipitation characteristic of winter time snow events.

1-3-4. RIBBON DISPLAY

a. The Ribbon Display is used to display centerfield wind, and microburst/wind shear alert messages from SWS equipment that must be reported by ATC personnel to pilots. Each Ribbon Display can have nine runways assigned to it. The assignment of runways is done at the ITWS Situation Display.

b. Upon detection of wind shear or a microburst, the ITWS Situation Display determines if an active runway is affected. If so, the alarm is routed to the Ribbon Display and is displayed as a MBA or WSA and an audible alarm is activated. Upon receipt of a WSA/MBA, Tower personnel must issue the alert as required by FAA JO 7110.65.

EXAMPLE-

18LA WSA 30K+ 2MF

"Runway 18L Arrival Wind Shear Alert, 30 knot Gain, 2 mile final"

36RD MBA 20K- 1MD
"Runway 36R Departure Microburst Alert, 20 knot Loss, 1 mile departure"

c. If SWS is non-operational, centerfield wind direction and speed, will be all 9's. ASOS and hourly weather observations may be used as a backup, if used, winds must be issued as "estimated".

1-3-5. AIRPORT LIGHTING PANEL

a. Airport lighting is maintained by Tulsa Airport Improvement Trust. Tower control of airport lighting is via a touch screen control panel located between LCE and GC. There are two additional control panels, one is located on the 7th floor, the other is located at the electric power vault on the field.

b. The touch screen control panel consists of 5 pages; Preset Page, Runway Page, Taxiway Page, Utility Page, and Power Page.

1. Preset Page. The preset page is the primary used page that all lighting command changes should normally take place. Preset controls are developed in conjunction with FAA JO 7110.65 and defines what intensities 1-step, 3-step, and 5-step circuits should be at during all levels of visibility and day or night conditions. Preset circuits do not allow a specific intensity selection, rather selections are made via the Active Runway Selection, Day/Night Setting, and the Visibility Setting, and the lights are turned on/off reference a pre-programmed table. To operate the lights from the Preset Page:

- make your selection from each section
- select CONFIRM to send the command, or
- REJECT to change or cancel your selections
- the airport map displays the changes made

2. Runway Page. The runway page is used to manually override any commands that were initiated by the preset commands. On the Runway Page, you may selectively adjust the lighting of individual runway circuits. To operate the Runway Page:

- select the runway(s) circuit
- select the intensity
- select the CONFIRM button
- the airport map displays the changes made

3. Taxiway Page. The taxiway page is used to manually override any commands that were initiated by the preset commands. On the Taxiway Page, you may selectively adjust the lighting of individual taxiway circuits. To operate the Taxiway Page:

- select the taxiway(s) circuit
- select the intensity
- select the CONFIRM button
- the airport map displays the changes made

4. Utility Page. The utility page includes a variety of utility functions that are used for touch screen maintenance and other control and administrative purposes. Most of these controls are not used by ATC personnel. One control that may be useful is the Clean Screen button. When the Clean Screen button is depressed, you may use a soft cloth and non-abrasive cleaner to clean the touch screen monitor. When finished, press the "Done" button.

5. Power Page. The power page contains information as it relates to the airfield lighting vault generator and utility equipment. The airfield lighting generator is operated during CAT II operations. Procedures for operating the Airport Lighting Generator are located in paragraph 1-3-1.a. of this order.

6. Maintenance Lockout. On occasion, it may be necessary for airfield electricians to perform work on a lighting circuit without causing alarms at the ATC touch screen. This can be done using the Maintenance Lockout feature available at other locations in the system. During the time of the maintenance lockout, the Tower will not have control of the locked out circuit at any time.

1-3-6. AIRPORT GROUND LIGHTING

a. All runways are equipped with High Intensity Runway Lights (5-Step) as follows:

1. RWY 36R – Edge, Centerline, and Touchdown
2. RWY 18L- Edge and Centerline
3. RWY 8/26 – Edge
4. RWY 36L/18R – Edge

b. All runways are equipped with Precision Approach Path Indicators (PAPI).

c. 36L/18R are equipped with Runway End Identifier Lights (REILS).

d. Runway 26 is equipped with Medium Intensity Approach Lighting System with Runway Alignment Indicator (MALSR).

e. All taxiways are equipped with three step lights. The following taxiways have Centerline Lights: J, J1, J3, H, F, G and G1. Additionally, all taxiways that cross a runway have Runway Guard Lights installed to warn pilots of the runway intersection. Runway Guard Lights are commonly referred to as "wig-wags".

1-3-7. AIRPORT LIGHTING PROCEDURES

Operate airport lighting in accordance with FAA JO 7110.65 except as follows:

a. Activate field lighting 30 minutes prior to sunset daily.

b. Operate airfield lighting for energy conservation during the hours of 0000-0500L as follows unless traffic dictates otherwise:

1. Advertise one runway and operate runway lights to advertised runway only.

2. Operate PAPI's to advertised runway only.

3. Operate taxiway lights serving the advertised runway only.

4. Operate approach lights to advertised runway only.

1-3-8. IDS-4

a. IDS-4 is a system of computer networks that distribute and display static and real-time data utilized by ATC. All operational positions at TUL are equipped with an IDS-4 monitor and trackball for viewing data. Additionally, FD/CD and TRACON FLM positions are equipped with an IDS-4 monitor, keyboard, and trackball, and are able to make updates and changes to the IDS-4 data. The majority of data located on the IDS-4 is maintained by TUL Support Staff. However, real-time data is maintained by FD/CD and the TRACON FLM.

b. Real-time data maintained by FD/CD and the TRACON FLM includes the Status Information Area (SIA) and NOTAM pages. METAR observations for both TUL and RVS are automatically updated via a network between ASOS and IDS-4. There is approximately a 3 minute delay from the time ASOS sends the METAR observation and IDS-4 receiving and displaying the data. Therefore, personnel should use caution when reading the weather sequence for an updated ATIS and ensure the IDS-4 weather sequence is current.

c. The SIA on the IDS-4 contains information for both TUL and RVS, and is utilized by positions in the Tower and TRACON. Information located on the SIA is, METAR observations, ATIS codes, Runways and Approaches in use, and pertinent NOTAM's and outages. The TRACON FLM/CIC is responsible for ensuring the accuracy of the SIA data and for ensuring "PIREP" is added and/or removed from the IDS-4 - as required by weather conditions.

1-3-9. FLIGHT DATA INPUT/OUTPUT (FDIO)

a. The FDIO is a flight data processing system used to print out flight plans, weather, and general information messages, as well as provide input capability to the host system.

b. FDIO equipment is located in the TRACON and consists of a monitor, keyboard and printer. Radar positions receive flight plan information for overflights and departures off of satellite airports within TUL's airspace. Arrival flight plans are not used at TUL and are disabled during daytime operations to reduce costs. When Radar positions are worked from the Tower, notify ZKC TMU (dial 05 on the ZKC 24 line) to show TUL in a night time configuration. When the Radar positions are reopened in the TRACON, notify ZKC TMU to show TUL in a day time configuration.

c. Printer Identifications for FDIO output are:

1. TRACON TULD, TULO and TULA
2. Tower TULT

d. When RADAR is closed (normally for Mid-Shift), all printers are combined to the Tower.

e. When RADAR is open, TULD and TULO are the RADAR printers, and TULT is the Tower printer. TULA may be turned on by calling the ZKC TMU and ask that it be turned on.

f. FDIO Printer Names/Functions - Arrival: TULA, Departure: TULD, Overflight: Overflight, Tower: TULT

1-3-10. TOWER DATA LINK SERVICES (TDLS)

The TDLS platform is designed to support multiple concurrent applications used by ATC on one platform. TDLS supports three applications: PDC Application, D-ATIS Application, and FDIO Emulation.

a. PDC Application. The PDC Application displays clearances received from ZKC ARTCC. FD/CD appends local departure information and transmits the clearance via data link to participating users.

b. D-ATIS Application. The use of the D-ATIS Application is twofold: (1) provides ATIS text messages via data link to participating users, (2) provides computer-synthesized ATIS voice messages. The TDLS D-ATIS Application uses weather input from ASOS, and preprogrammed/free text input by FD/CD to generate the ATIS message.

c. FDIO Emulation. Distribution of flight plan data, weather information, and general information messages from the ARTCC National Airspace System computer to Terminal facilities is accomplished by the FDIO system. TUL FD/CD utilizes FDIO Emulation via the TDLS platform along with a Replacement Flight Strip Printer for FDIO functions. The TDLS platform does not change any functionalities of the FDIO.

1-3-11. MANUAL ATIS

When the D-ATIS application on the TDLS is out of service it is necessary to record a manual ATIS. A script for recording an ATIS is located on the IDS-4 on the TOWER page. Utilize the following procedures to record a manual ATIS:

a. To Record:

- Select the ATIS RCDR button on the TDLS TICS box located to the left of the FDIO Printer.
- Position the on-1/off-1 switch in the “off-1” position.
- Install the PTT handset. (Use only the handset mark for ATIS).
- Place the mon/rec switch in the “rec” position.
- Momentarily press the start/reset switch to the “reset” position.

- Depress and hold the PTT button on the handset to record the message.

b. To Monitor:

- Place the mon/rec switch in the "mon" position.
- Momentarily press the start/reset switch to "reset".
- Place the start/reset switch in the "start" position.
- Monitor the recorded message for accuracy.
- Place the start/reset switch in the middle position.

c. To Transmit:

- Place the on-1/off-1 switch in the "on-1" position.

d. To Return to TDLS D-ATIS Application:

- Select the TDLS VSU button on the TDLS TICS box.

1-3-12. VHF OMNIDIRECTIONAL-RANGE TEST (VOT)

A VOT transmits a test signal on a VHF frequency that provides aircraft a convenient means by which to determine the operational status and accuracy of a VOR receiver. The TUL VOT monitor panel is located on the west side of the FD console in the Tower. The TUL VOT frequency is 109.0.

1-3-13. RUNWAY VISUAL RANGE (RVR)

Runway 36R/18L is equipped with RVR equipment that reports Touchdown, Midpoint, and Rollout values. When in use, the runway lights must be set at an intensity of 3, 4, or 5. TUL has four RVR displays; one in the Tower at the GC position, and three in the TRACON. Additionally, all positions have the ability to display RVR on the IDS-4.

1-3-14. INSTRUMENT LANDING SYSTEM (ILS)

a. TUL has two instrument runways served by a CAT I ILS approach and 1 instrument runway served by a CAT I or II ILS approach. A CAT I ILS is an approach procedure which provides for an approach to a height above touchdown of not less than 200 feet and an RVR of not less than 1,800 feet. A CAT II ILS is an approach procedure which provides for an approach to a height above touchdown of not less than 100 feet and an RVR of not less than 1,200 feet. Monitoring equipment for each of the systems is located in the Tower.

1. 18L ILS (Localizer I-DWE – 109.7) CAT I ILS

2. 36R ILS (Localizer I-TUL – 110.3) CAT I or II ILS

3. 18R ILS (Localizer I-TJY – 111.1) CAT I ILS

b. The approved height and distance limitations for all Localizers are 5,000' MSL and 18NM.

c. Runway 18L ILS/36R ILS Panel.

1. Runway 18L and 36R ILS's are controlled by the same panel located between LCE and GC in the Tower. Only one ILS can operate at a time. The ILS that is ON is displayed at the top left of the panel. To change systems, select the Runway button directly below the Selected Runway readout on the top left of the panel. Other functions available are the Test and Silence buttons. The Test button is used to test all indicators, both aural and visual. The Silence button is used to silence an aural alarm or to cancel a Runway change request.

2. The rest of the panel consists of indicator lights. The indicator lights give the controller a quick view of what system and its components are operational. Along the top right are the indicators for CAT I, II, or LOC Only. The LOC Only will light Yellow to indicate the ILS Localizer is the only operation allowed. The CAT I indicator will light Green to indicate that CAT I ILS operation is allowed. The CAT II indicator will light Green to indicate that CAT II ILS operation is allowed, or it will flash to indicate **entering** CAT II is not allowed.

3. The indicators for the CAT II Localizer and Glideslope have the following meanings. The Main indicator lights Green when the system is ON, and flashes when the system is bypassed. The Standby indicator lights Yellow when the Standby system is ON, and flashes when the system is bypassed. The Off indicator lights Red when the system is Off. When either the Main or Standby systems are bypassed, that system is off and cannot be used unless advised otherwise by TO.

4. The operational status of the Inner Marker, Middle Marker, Outer Marker, and DME are noted by On/Off indicators. The On indicator lights Green when the system is ON, and flashes when the system is bypassed. When a component is bypassed, consider it out-of-service and notify TO. The Off indicator lights Red when the system is Off.

5. The operation of the Far Field Monitor (FFM) is displayed using indicator lights. The Normal indicator lights Green to indicate the signal is in-tolerance. The Alarm indicator lights Red to indicate the signal is out-of-tolerance. The Bypass indicator lights Yellow when the FFM is bypassed. Notify TO if the FFM is bypassed.

d. Runway 18R ILS.

1. Runway 18R ILS is a Category I ILS and operates continuously. The panel is for monitoring only and consists of a Volume Knob, an Aural Alarm Speaker, an Alarm Silence Button, and Green and Red lights for both the Localizer and Glideslope.

2. The internal monitoring devices on the 18R system will automatically shut down the equipment when out of tolerance (indicated by a red light). When this happens, the system

will attempt to self-restore. If the green light does not return after 5 minutes, maintenance must be advised.

e. Runway 36R CAT II ILS.

1. Runway 36R is equipped with a Category II ILS. The CAT II ILS has specific requirements that must be met before using the approach. First, all components serving the ILS must be operational. If all of these components are not operational, you cannot enter CAT II operations. These components are:

- Localizer
- Glideslope
- Compass Locator
- DME
- Inner Marker
- Far Field Monitor
- RVR
- Approach Lighting System with Flashers (ALSF)
- Runway Edge, Touchdown Zone, and Runway Centerline Lights
- Backup Generators for Runway Lights and Approach Lights

2. Second, when the RVR drops below 4,000' and is forecast to go to CAT II conditions (less than ceiling 200' or RVR less than 1,800'), request from TAIT Operations a Runway Light Check. Note that a Runway Light Check is required every 2 hours while in CAT II conditions.

3. Next, when the ceiling drops below 200' or the RVR drops below 1,800', start the Airport Runway Lighting and Approach Lighting System generators. Notify TAIT Operations when the Airport Runway Lighting generator is turned On/Off.

4. Should any component necessary for CAT II operations fail, refer to Appendix C for guidance.

1-3-15. OUTER COMPASS LOCATOR (LOM).

OILLR is monitored in the Tower. The monitor panel is located south of the LCE position. When a Green light is displayed, the LOM is operational; when a Red light is displayed the LOM is out-of-service.

1-3-16. APPROACH LIGHT SYSTEMS (ALS)

Approach lighting systems are available for runways 36R, 18L and 26. Approach light panels for runway 36R and 18L are located between LCE and GC and are maintained by Tech Ops. The control panel for runway 26 approach lights is located on the Airport Lighting Panel and is maintained by Tulsa Airport Improvement Trust.

a. Runway 36R is equipped with an ALSF-2/SSALR system with sequenced flashing lights (SFL). The intensity levels are set in accordance with FAA JO 7110.65. SSALR is the standard lighting pattern and is most often used. ALSF-2 is used during CAT II operations and as indicated in FAA JO 7110.65. When Step 5 intensity level is used, it will remain on for 15 minutes then, it will automatically shift down to Step 4. Controllers must remain vigilant of this characteristic and ensure Step 5 is on when necessary. Operate Runway 36R ALS as follows:

1. Turn On ALS System

- Press Step 1 brightness switch.
- Press approach light switch – this turns on system
- Select either ALSF or SSALR
- Change brightness steps numbers in order to the brightness needed
- DO NOT SKIP STEPS
- Step 5 button does not stay depressed
- Step 5 stays on for 15 minutes, then reverts back to Step 4
- Turn on Flashers

2. Turn Off ALS System

- Turn off flashers
- Step down brightness (in order) to Step 1 (DO NOT SKIP STEPS)
- Turn off approach lights by depressing approach button

b. Runway 18L is equipped with a three step MALSR system with SFL. The intensity levels are set in accordance with FAA JO 7110.65. A knob is used to turn on/off the system and to set the intensity level. A separate button is used to turn on/off the SFL.

c. Runway 26 is equipped with a three step MALSR system with SFL. The SFL operate in unison with the approach lights and do not have separate controls. To operate the approach lights from the RUNWAY LIGHTING PAGE, select the 26 MALSR button, then select the appropriate STEP and select CONFIRM. To operate the approach lights from the PRESET PAGE, select the 26 Operations button, Select the correct Visibility and select confirm.

1-3-17. DROP TUBE OUTAGE PROCEDURES

a. Automatic releases are approved provided the Tower TDW's are operational.

b. Local Control must ensure initial Radar Identification and Departure Acquisition for all TUL departures.

1. Ensure initial radar identification is accomplished IAW FAA JO 7110.65. Local Control is not required to inform the aircraft of "Radar Contact". The initial departure controller will inform the aircraft it is in "Radar Contact".

2. Ensure STARS acquisition and accuracy of a departure track has occurred prior to *communication transfer*. A manual hand off must be performed prior to exiting tower airspace if STARS acquisition has not been accomplished.

c. Clearance Delivery must force a strip to the TRACON when an IFR clearance is issued.

d. Special VFR/Local IFR departures must be manually coordinated.

e. IFR/VFR departure headings are as normally assigned. LC must ensure initial separation of departures.

f. Tower strips must be collected and delivered to the TRACON FLM/CIC at the end of the day.

1-3-18. ENHANCED TERMINAL VOICE SWITCH (ETVS) COMMUNICATIONS SYSTEM

a. The ETVS is a fully-integrated, digital voice communications system that enables an operator to utilize radio, intercom, and telephone communications using a single jack box. The ETVS equipment consists of a Touch Entry Display (TED), a Speaker Module, a POTS Module, and a Jack-box for an instructor and trainee.

b. The TED consists of pre-programmed pages used for radio, telephone, and intercom communications. All of TUL's frequencies are available on each TED. Each frequency has both main and standby transmitters and receivers, with the exception of RVS Ground frequency. RVS Ground frequency has only a Main Transmitter and Receiver.

c. The intercom/landline communications consist of Override lines, Shout lines, and Dial lines. Override lines are programmed for all positions at TUL. Shout lines are available to ZKC, ZFW, ZME, and RVS. The Dial lines available are the ZKC 24, ZFW 74, and the ZME 14 lines. Dial codes for these lines are available on the IDS-4.

d. Outside telephone lines may be accessed at all TED's. Additionally, several commonly used phone numbers to FBO's at TUL have been pre-programmed into the ETVS system. All communications through the ETVS system are recorded.

e. Phone calls received via the Mitel Phone System may be transferred to the ETVS. This is done by transferring the call to extension 6793 and then selecting the outside button on the ETVS. All requests for IFR clearances received on an outside telephone line must be transferred to the ETVS before the clearance is issued.

f. The POTS Module consists of knobs to control headset/side tone volume, chime and speaker volume, and TED brightness.

g. The Jack-box consists of two jacks, one for the instructor and one for the trainee. The instructor jack can override the trainee jack when both are in use.

1-3-19. BACKUP EMERGENCY RADIOS

a. If the ETVS should fail, standby emergency jacks are available at all positions as follows:

EMERGENCY RED JACKS	
Positions	Frequency
CD, GC, LCE, LCW, RW, RE, RF	VHF and UHF for each position
RSW, RSE	VHF for each position
ASR	VHF/UHF Guard

TBL 1-3-1

b. There are two portable PET2000 Transceivers; one is located in the Tower next to LCW, and the other is located in the TRACON between RW and RSE.

1-3-20. ASR-9 RADAR.

There are three ASR-9 Radar panels. One is located in the Tower adjacent to LCE, one is in the TRACON at the FLM desk, the other is located at the Radar site. The ASR-9 has both a Channel A and a Channel B. Typically, the TRACON panel has control to make Channel changes. This function will be transferred to the Tower when all positions of operation are located in the Tower. To change Radar Channels the following procedures must be followed:

- Advise the TRACON positions you are making a Radar Channel Change.
- Turn off the High Voltage on the current Channel.
- Select the new Channel.
- Turn on the High Voltage for the new Channel.

When all Radar positions are worked from the Tower, control of the ASR-9 panel must be transferred to the Tower. This is accomplished by selecting the “Release Control” button on the TRACON panel, and selecting the “Take Control” button in the Tower. When positions are reopened in the TRACON, you need only to select the “Take Control” button on the TRACON panel.

1-3-21. MODE-S BEACON

Tulsa’s secondary Radar system is a Mode-S Beacon. The Mode-S system has both a Channel A, and a Channel B for backup. Additionally, the older ATCBI Beacon system is available for backup with both Channels A and B. There are two monitor panels for Tulsa’s secondary Radar. One is located in the TRACON at the FLM desk, the other is located at the Radar site. The monitors’ are touch screen and beacon channels can be changed at the monitor that has control, typically this is the TRACON monitor. To change beacon channels, select the beacon channel

that is in standby. When changing to/from ATCBI, always select the same channel, A or B as is currently in operation.

1-3-22. ARRESTING GEAR OPERATION.

The Arresting Gear Control panel is located at the LCE position and is used to operate all barriers in accordance with the TUL ATCT/138th Fighter Group of the OK ANG LOA. The OK ANG is responsible for the maintenance of the arresting gear and the control panel. There are four barriers located on the airport. They are located on the approach ends of RWYs 18L, 36R, 8 and 26. The distance from the approach end is as follows:

- RWY 18L – 1500'
- RWY 36R – 1500'
- RWY 8 – 1500'
- RWY 26 – 1500'

The panel itself consists of two sets of toggle switches for each runway. One toggle switch gives control of the barriers to the Runway panel or to the Tower Panel. An amber light is lit indicating which panel has control. The other toggle switch moves the barrier to the up or down position. A green light indicates the barrier is in the down position and a red light indicates the barrier is in the up position. If the barrier is left in the up position for over 3 minutes, an aural alarm will sound to alert the Local Controller. To silence the alarm, press the TEST/RESET button in the middle of the panel.

Additionally, there are two sets of trouble lights for each runway. One light indicates a COMM failure and the other indicates a POWER failure. Should a failure occur, the amber light above the type of failure will illuminate. All malfunctions must be reported to the ANG.

1-3-23. AUTOMATED AIRPORT CLOSURES MAP

A computer monitor and mouse are located between the GC and LCE positions for the use of the Automated Airport Closures Map (AACM). This map is used to show real-time runway and taxiway closures. There are separate tabs at the bottom of the page for each taxiway at TUL and for taxi-lanes and run-up areas. The runway closures are selected from the main map page. Open movement/non-movement areas are shown in green and closed areas are shown in red.

To change the status of an area:

Click on the Taxiway designator at the bottom of the page.
Find the portion of the taxiway that needs to be changed.
Select the "RED" box to close an area, or the "GREEN" box to open an area.

Taxiway closures are broken down into segments to allow for partial closures. Additional sections can be developed on an 'as needed' basis during long term construction projects. All change requests must be forwarded to the Support Staff.

Section 4.
STANDARD TERMINAL AUTOMATION REPLACEMENT SYSTEM (STARS)

1-4-1. GENERAL

Providing adequate operational STARS performance takes precedence over incident/error analysis, program support, or other non-operational activities. To that end, STARS Full Service Level (FSL) must be the primary operational mode. STARS Direct Sensor Access (DSA) is the backup mode of operation in case of failure of STARS FSL processors. STARS FSL must not be used when FSL has been released to Tech Ops.

1-4-2. POSITION SYMBOLS

CD	K		RSW	B		FLM	S
GC	U		RSE	A		AT COACH	L
LCE	T		RF	G		AT COACH	R
LCW	V		ASR	N		ZKC	C
RW	W		RVS LC	J		ZME	M
RE	E		RVS CD	D		ZFW	F

1-4-3 RANGE SETTING

Range settings must be set at the controller's discretion, but at a range compatible to timely hand-off's from other positions/facilities.

1-4-4. WEATHER SETTING

The weather system setting on the ASR-9 panel will be set on 6-level weather during normal conditions. The weather setting will only be changed to 2-level weather if 6-level weather is inoperative. When 6-level weather is selected, each controller is responsible for displaying weather on their displays in accordance with FAA JO 7110.65. When 2-level weather is selected, each controller will display weather levels 2 and 4 on their displays.

1-4-5. SYSTEM STATUS AREA (SSA)

a. The SSA must be displayed at each operational TCW (and TDW if working radar from the tower during hours that RVS tower is open) and must contain the following information as a minimum:

1. Weather Data
2. Time and Altimeter
3. TUL (Main) GI text
4. RVS GI text

b. Additional SSA fields may be selected at user discretion. FLM/CICs should monitor a fully displayed SSA (all fields) whenever possible.

c. When a new ATIS code is published at TUL or RVS, the GI Text Area will flash in the SSA until acknowledged by the CPC signed on the position. *The specialist must broadcast the new ATIS code prior to acknowledging the flashing code in the SSA.*

1-4-6. FILTER LIMITS

a. The minimum settings for each position are as follows:

1. RW/RE - 006-160

2. RF/ASR - 006-100

3. RSW/RSE - 006-060

4. LCE/LCW - 006-100

b. During periods of heavy traffic over RVS, all positions except RSW/RSE may reset the lower associated filter limits to 026 to reduce clutter.

1-4-7. PROMINENT OBSTRUCTIONS

Prominent obstructions must be displayed utilizing the MVA map.

1-4-8. MTI REFLECTORS

An MTI reflector is located on top of the TUL Air Traffic Control Tower.

1-4-9. PERMANENT BEACON TARGETS

Permanent beacon targets are located in reference to the Radar Site as follows:

a. ASR9 permanent beacon - 360/55 NM. The permanent beacon ID is RDR00.

b. MODE S permanent beacon – 180/54 NM. The permanent beacon ID is N10 and the beacon code is B7770.

In the event it becomes necessary to verify the correct alignment of the video map, the following steps should be used to verify alignment:

a. Select RTQC (Real Time Quality Check) on the DCB.

b. Select map 31.

c. If the map is correctly aligned in reference to the ASR9, there will be a diamond inside of a box at 360/55 NM.

d. If the map is correctly aligned in reference to the MODE S, there will be an asterisk inside of a box at 180/55 NM

1-4-10. POINTOUTS

All point-outs from the ARTCC's are required to be tagged. This may be done using the keyboard entry *#### (asterisk followed by the beacon code) or by typing the 3-letter ARTCC ID and a sequential number.

1-4-11. SECTOR PLANS

a. Sector Plans are entered as follows: F8 C # (1-7). The numeric characters denoting the Sector Plans are as follows:

STARS Configurations		
Config. #	**Flow**	**Positions Open**
1	North or South Flow	RW, RE, RSW, RSE
2	North or South Flow	RW, RE
3	East or West Flow	RW, RE, RSW, RSE
4	Any	RW
5	Any	Tower
6	Reset Configurations to Default Settings – Used to Clear Problems	
7	Any	RW, RSW

TBL 1-3-2

b. When a Sector Plan is entered, all TCP's are automatically deconsolidated and will require consolidation entries. STARS entry to consolidate keyboards:

F8 C 1(position receiving) 1(position giving) + Enter

c. STARS entry to deconsolidate keyboards:

F8 C Enter

1-4-12. BRIGHTNESS LEVELS

Brightness levels must be set so Primary (PRI) targets, Secondary (BCN) targets, Position Symbols (POS), Full Data Blocks (FDB), Limited Data Blocks (LDB), and Other LDB/PDB position Symbols (OTH) are visible at all times. Brightness levels for List (LST) and Weather (WX) must be set so they are visible when selected. All other brightness levels are optional.

1-4-13. ALERTS

MSAW, CA and MCI alerts may be acknowledged and silenced at the appropriate position (slew) once the controller evaluates the event.

1-4-14. REQUESTED ALTITUDE FIELD

Requested Altitude appears in the requested altitude field of all NAS/STARS FSL flight plans. The requested altitude field may be modified with the implied entry: "+, +, then 3-digits <SLEW>". When used, the data contained in the Requested Altitude field must be maintained as current when transferring radar identification within the facility and may be used for automated point-out purposes.

1-4-15. ASSIGNED ALTITUDE FIELD

The Assigned Altitude field (+, then 3-digits <SLEW>) may be used, but must be cleared prior to Handoff or radio communications transfer to another position.

1-4-16. RESTRICTED AREAS

Restricted Area text, circles, and polygons may be used for operational requirements such as TFRs, Parachute Jumping, Closed Runways/Airports. Any other use must be at the direction of the FLM/CIC and only if operationally advantageous.

1-4-17. WORKSTATION MESSAGING

Workstation Messaging must not be used.

1-4-18. WORKSTATION NOTES

Workstation Notes (F12, N1-N4) may be created at controller discretion provided they contain operational information.

1-4-19. RADAR ORDER OF PRIORITY

The order of priority for the display of RADAR information is as follows:

a. FUSION

b. ASR-9 Single Site

c. QAF Single Site

1-4-20. RADAR SENSOR

The radar sensor may be displayed in the SSA. Radar separation standards have the following minima:

a. FUSION

1. 3 NM. – Use map 58 or map 59 on the DCB. The mnemonic on the DCB is FUS3_1 and FUS3_2 respectively.

2. 5 NM – (as soon as feasible) when "ISR" is displayed on a track, (target resolution is prohibited). Use map 6 or map 55 on the DCB. The mnemonic on the DCB is FUS5_1 and FUS5_2 respectively.

3. Mode C, or pilot reported altitude, must be displayed and kept current all times that the aircraft is in level flight.

b. Single Site TUL ASR-9 with Mode S (Indicated by "TUL MODE-S" in the SSA).

1. When less than 60 NM from the TUL ASR-9 site - 3 NM. Use map 58 or map 59 on the DCB. The mnemonic on the DCB is FUS3_1 and FUS3_2 respectively.

c. Single Site TUL ASR-9 in Independent Beacon Interrogator (IBI) Mode (Indicated by "TUL IBI" in the SSA). Use map 56 or map 57 on the DCB. The mnemonic on the DCB is MVANOS1 and MVANOS2 respectively.

1. When less than 40 NM from the TUL ASR-9 site - 3 NM.

2. When 40 NM or more from the TUL ASR-9 site – 5 NM.

d. Single Site QAF ATCBI Mode (Indicated by "QAF" in the SSA). Use map 53 or map 54 on the DCB. The mnemonic on the DCB is QAFMVA1 and QAFMVA2 respectively.

1. When less than 40 NM from the QAF ATCBI site - 3 NM.

2. When 40 NM or more from the QAF ATCBI site – 5 NM.

e. STARS Multi-Sensor Mode (Indicated by "SYS" in the SSA) or Single Site OKC ARSR (Indicated by "OKC" in the SSA). Use map 6 or map 55 on the DCB. The mnemonic on the DCB is FUS5_1 and FUS5_2 respectively.

1. Between aircraft, obstructions, and edge of scope – 5 NM.

2. From adjacent airspace – 2 ½ NM.

1-4-21. PREARRANGED COORDINATION

Prearranged Coordination procedures may be applied using STARS FSL, however separation minima must be applied within the parameters for TUL Single Site, QAF Single Site, STARS Multi-Sensor Mode or OKC Single Site.

1-4-22. IDENTIFICATION STATUS

When operating in STARS Single Sensor Mode, if TRK appears in the data block inform the aircraft that radar contact is lost. TRK appears in the data block whenever the aircraft is being tracked by a radar site other than the radar currently selected. A target will not be displayed in Single Sensor Mode when TRK appears in the data block; however, a position symbol and data block, including altitude information, will still be displayed. Low altitude alerts must be provided in accordance with FAA JO 7110.65, para. 2-1-6, Safety Alert.

1-4-23. OPERATIONAL MODE TRANSITION PROCEDURES

a. The TRACON FLM/CIC has the decision authority for transition from FSL to DSA and from DSA to FSL. Transitional decisions are based on system failure, system shut down, installation of new adaptation, resumption of operations, and status of inter-facility data.

b. The order and method of operational transition from FSL mode to DSA mode is as follows:

1. The TRACON FLM/CIC must advise all operational positions in the TRACON of planned outages.

2. TRACON operational positions make note of any aircraft tags for which an inter-facility handoff has been completed. These aircraft will not retain full data blocks after the return to FSL mode from DSA mode.

3. The TRACON FLM/CIC must advise ZFW, ZME, and ZKC to make manual handoffs.

4. Once all operational positions have selected DSA mode, the TRACON FLM/CIC will authorize FSL system shut down. All operational positions must follow DSA procedures defined in paragraph 1-4-24. STARS DSA OPERATIONAL PROCEDURES.

5. The TRACON FLM/CIC must monitor non-operational positions, which remain in FSL mode to determine when FSL mode is again available. During DSA operations, the TRACON FLM/CIC must aid in the detection and resolution of potential conflicts.

c. The order and method of operational transition from DSA mode to FSL mode is as follows:

1. The TRACON FLM/CIC must advise all operational positions in the TRACON to select FSL mode.

2. The TRACON FLM/CIC must instruct Radar Data to enter a “Restore Base” command on the FDIO (RB TUL <ENTER>).

3. The TRACON FLM/CIC must enter the appropriate Sector Plan and Consolidation/Configuration into the STARS keyboard.

4. The TRACON FLM/CIC must advise the Tower Cab and RVS ATCT of the transition from DSA mode to FSL mode.

5. The TRACON FLM/CIC must advise ZFW, ZME, and ZKC that automated handoff capability has returned.

6. The TRACON FLM/CIC must aid in the detection and resolution of potential conflicts.

1-4-24. STARS DIRECT SENSOR ACCESS (DSA) OPERATIONAL PROCEDURES

a. DSA mode can be selected using the DCB or the keyboard.

Using the DCB:

1. Click on the MODE button.
2. Click on the DSA button.
3. Click ACCEPT.
4. Click DONE.

Using the KEYBOARD:

1. Press and hold down the <F16> key and the letter “D” at the same time. (This method can also be used to toggle back to FSL mode.)

b. Upon entering DSA mode the position will automatically be switched to single sensor slant range mode using the **TUL** radar. The current FSL sign-on status and display settings are transferred to DSA mode.

c. Aircraft that were tagged on a DISCREET BEACON CODE before switching to DSA mode will remain tagged following the switch to DSA mode. Aircraft that need to be tagged up after switching to DSA mode must be TAGGED UP MANUALLY.

To tag an aircraft do the following:

1. Press <INIT CTRL>
2. Type ACID
3. Slew to the desired track.

NOTE: ONLY AIRCRAFT ON A DISCREET BEACON CODE CAN BE TAGGED UP IN DSA MODE. VFR aircraft on a 1200 beacon code cannot be manually tagged in DSA.

d. Code banks are transferred over to DSA mode but codes can't be assigned from the STARS keyboard. Code must be assigned and tracked manually. Flight Data/Clearance Delivery and Radar West/Radar East will split the 03 code bank. It is assumed that aircraft will be active in the system squawking codes from this code bank. To reduce the chances of duplicating code assignments, assign codes as follows:

1. FLIGHT DATA code bank is: **0320 – 0340**
2. RW/RE code bank is: **0341 – 0377**
3. RSW has the 02 code bank.

NOTE: Manually writing the beacon codes on the left side of a note pad is suggested followed by writing the call sign next to the associated beacon code once assigned. After radar service is terminated with the aircraft draw a line through the call sign to show that the code is now available. See example below:

0320	~~N123TB~~	
0321	N345TR	
0322		
0323		

EXAMPLE

e. When DSA mode is selected "DSA" will appear in the Mode of Operation field in the System Status Area (SSA).

f. The TUL automatic ALSTG (altimeter) reading will be disabled, and an "M" will be displayed in the altimeter field in **TUL 29.92M** yellow.

g. Targets are only displayed with target symbols, not with position symbols.

h. The current FSL sign-on status and display settings are transferred to DSA mode. Weather processing, altimeter setting commands and local-settings commands listed below.

• Range	• System Status Area Position
• Center	• Preview Area Position
• Static Geographic Maps	• Leader Line Length and Position
• Brightness	• Cursor Home
• Beacon Code Blocks	• Cursor Speed
• Character Size	• DCB Position
• History Trails	• Range Ring Spacing and Position

i. Many features and functionalities are not available in DSA mode. “CMD NOT AVAIL” will display in the Preview Area when an unavailable command is entered.

The following are ***NOT AVAILABLE*** in DSA mode:

• FDB’s (no data block manipulation	• Preference Sets (PREF button is disabled)	• MSAW/CA/MCI Alerts
• WX History	• Consolidation/Sectorization	• Minimum separation (NO XING will display)
• PTL is disabled	• Instrument Approach Stats	• Altitude Filtering
• ADS-B data loss indicator	• Sign-on/Sign-off	• SPC code aural alarm and acknowledgement
• MOA/CRDA/RTQC	• Text messages	• Position Symbols
• **AIRCRAFT SPEED**		• **AIRCRAFT TYPE**

• **FLIGHT PLAN PROCESSING and Related Functions (create/delete/suspend, track ownership, handoff, pointout, flight lists, scratchpad entries, duplicate beacon**
• Tracking and Commands that require an associated track. **(Automatic Handoff)**

1-4-25. RADAR SELECTION PROCEDURES

a. During normal operations, FUSION must be the preferred sensor to the extent that it is operationally feasible. When either TUL ASR-9 or QAF Long Range is OTS, the facility must transition out of FUSION to the single site RADAR that is operational.

b. The TRACON FLM/CIC has decision authority to transition to alternate sensor selections.

c. The TRACON FLM/CIC must advise the Tower, and RVS ATCT, when the facility transitions to/from an alternate sensor.

d. The TRACON FLM/CIC must advise ZFW, ZME and ZKC if the transition puts us in ATC Alert as described in the ATC Contingency Plan.

e. The TRACON FLM/CIC must aid in the detection and resolution of potential conflicts during sensor transitions.

1-4-26. KEYBOARD ENTRIES

a. VFR Flight Plans

Call Sign (space)
△ (Scratch Pad) (space)
Type Aircraft (space)
Position Symbol (space)
Enter

b. VFR Flight Plans – Negative Transponder

Call Sign (space)
△
△ (Scratch Pad) (space)
Type Aircraft (space)
Position Symbol (space)
Enter

c. VFR Flight Plans – Auto Pilots Central

Call Sign (space)
Beacon Code
△ (Scratch Pad) (space)
Type Aircraft (space)
Position Symbol (space)
.V
Enter

d. VFR NAS Flight Plans

Call Sign (space)
Destination Airport (space)
Type Aircraft (space)
Position Symbol (space)
Enter

e. Local IFR, VFR OTP, and SVFR Flight Plans

Call Sign (space)
+
Delta Key (Scratch Pad) (space)
Type Aircraft (space)
Position Symbol (space)
Enter

Chapter 2. TOWER

Section 1. FLIGHT DATA (FD)

This section describes the duties and responsibilities of the Flight Data position. Flight Data must:

2-1-1. STARS

a. Amend flight plans in STARS to appropriate sector as applicable.

b. Enter flight plan information into STARS for VFR, NAS VFR, Local IFR, VFR OTP, and SVFR aircraft.

c. Monitor the General Systems Information and the altimeter setting in the STARS Systems Area and verify the altimeter is being updated automatically by the DASI. In order to accomplish this, the "TUL ALSTG" must be selected in the DCB. When auto update is functioning properly the airport three-letter identifier, altimeter and the letter "A" will be displayed in the systems area in the color green. (TUL 29.92A) IF, the DASI connection fails the information will change color to yellow, the "A" will change to an "M" and it will all flash. (TUL 29.92M) The "M" means the altimeter is missing and must be input manually by Flight Data. (The altimeter can be input manually from any position. However, it is Flight Data's responsibility.)

NOTE: If the altimeter is entered manually (F7, S, 2992 ENTER) the auto-update function will be turned off and the system will be in manual mode. This will be indicated by the missing "A" at the end of the line of information.(TUL 29.92) The entry required to put system back in auto-mode is: (F7 A TUL, 29.92A ENTER)

2-1-2. IDS-4

a. Update SIA information on IDS-4 in accordance with the following:

- TUL Weather (if not automatically updated)
- ATIS Code
- Active Runways
- Approach in Use
- Tower Visibility (when applicable)
- DASI Correction Factor
- Outage/Closures (Shared responsibility with TRACON FLM/CIC)
- Miscellaneous (HIWAS, SWS, Birds, etc.)

b. Assist the TRACON/Tower FLM/CIC with updates to the IDS-4 including equipment/NAVAID outages and NOTAM's.

2-1-3. ASOS

a. Coordinate with Contract WX Office for weather sequence when ASOS is out of service.

b. Send Tower Visibility Observations when instructed by Local Control to the Contract WX Office via ASOS or if ASOS is out of service, via landline.

2-1-4. FDIO

a. Assist Clearance Delivery with making amendments to NAS Flight Plans via FDIO.

b. Send Departure Messages (DM) via FDIO or landline if FDIO is out of service during periods when STARS is not interfaced.

c. Assist Clearance Delivery in preparation of flight progress strips.

2-1-5. D-ATIS

a. Update the D-ATIS/ATIS recording as required per FAA Order 7110.65 and 7210.3.

b. Review the D-ATIS/ATIS recording for completeness, accuracy, speech rate and proper enunciation prior to transmitting.

c. Advise tower positions of the new D-ATIS/ATIS code and enter it into the STARS Systems Area and the IDS-4.

2-1-6. TRAFFIC MANAGEMENT

a. Receive, update and coordinate TMU information on affected aircraft which have not departed. TMU flow restrictions are received via the FDIO or landline. Post TMU messages in the CD strip bay.

b. Request release times from the appropriate TMU for aircraft affected by flow programs; including A/C ID, estimated departure time and departure runway. Disseminate flow control information to other positions via flight progress strip and/or verbal coordination**.**

NOTE-

1. *When flow programs are needed to an airport in ZFW's airspace, ZFW TMU will advise TUL via the landline. Release of these aircraft will be coordinated with ZFW TMU, even if the aircraft's route of flight goes through a different ARTCC. Any ZKC TMU generated flow control FDIO messages for A/C into ZFW's airspace are void.*

2. *IAH/HOU are located in ZHU's airspace and flow control programs received via FDIO are valid. Call ZFW TMU for release.*

c. Notify RVS Tower of TMU flow programs not received via FDIO. When notified by RVS, request release times from ZME and ZFW for aircraft departing RVS.

2-1-7. PIREP's

a. When conditions exist requiring the solicitation of PIREP's, notify the TRACON and Tower FLM/CIC.

2-1-8. MISCELLANEOUS

a. Distribute SIGMET's, AIRMET's and CWA's to all affected Tower positions. SIGMET's, AIRMET's and CWA's are received via the FDIO.

b. Distribute Aircraft Lookout messages to the TS/CIC. Maintain and update information at the FD position.

c. Assist the TS/CIC in CFR emergency notifications.

Section 2. CLEARANCE DELIVERY (CD)

This section describes the duties and responsibilities of the Clearance Delivery position. Clearance Delivery must:

2-2-1. CLEARANCES

Issue and ensure receipt of clearances for aircraft departing TUL in accordance with the following departure procedures:

a. NAS IFR:

1. Clear aircraft via the Preferential Departure Routing (PDR) if it is different from the filed route.

2. Assign all jets and military fixed-wing aircraft runway heading and an initial altitude of 15,000 or lower requested altitude.

3. Assign all props and helicopters an initial altitude of 2,500.

4. Assign all aircraft requesting an altitude higher than the initial altitude to expect requested altitude 10 minutes after departure.

b. LOCAL IFR:

1. Assign a clearance limit within the boundaries of TRACON's airspace.

2. Assign all jets and military fixed-wing aircraft runway heading and an altitude of 4,000.

3. Assign all props and helicopters an altitude of 2,500.

c. VFR OTP:

1. Assign a clearance limit within the boundaries of TRACON's airspace.

2. Assign all jets and military fixed-wing aircraft runway heading and an initial altitude of 4,000.

3. Assign all props and helicopters an initial altitude of 2,500.

4. Assign all aircraft to expect clearance to VFR-On-Top 10 minutes after departure.

PHRASEOLOGY-
"ACID, CLEARED TO THE (clearance limit) VIA RADAR VECTORS, FLY RUNWAY HEADING (if appropriate) MAINTAIN (2,500 or 4,000 as appropriate), EXPECT CLEARANCE TO VFR ON TOP ONE ZERO MINUTES AFTER DEPARTURE. DEPARTURE FREQUENCY WILL BE _____, SQUAWK _____."

d. SVFR:

1. Clear departures out of the Class C surface area via a quadrant (NW, NE, SE, or SW) that does not overlie Finals' airspace.

2. Clear Army Air National Guard helicopters via any coded departure route depicted in the LOA regardless of flow and use scratchpad entries in TBL 1-2-11.

3. Assign all aircraft an altitude of at or below 2,500.

PHRASEOLOGY-
"ACID, CLEARED OUT OF THE CLASS C SURFACE AREA (direction) OF TULSA AIRPORT, MAINTAIN SVFR CONDITIONS AT OR BELOW 2,500, DEPARTURE FREQUENCY WILL BE _____, SQUAWK _____."

e. VFR:

1. Assign all jets and military fixed-wing aircraft runway heading and an altitude of at or below 15,000.

2. Assign all props and helicopters an altitude of at or below 2,500.

3. Use scratchpad entries in TBL 1-2-11 for Army Air National Guard helicopters requesting coded departure route depicted in the LOA.

f. Assign the following beacon codes to aircraft requesting to remain in closed traffic:

0373 – RWY 18L/36R & Lunar Pad
0374 – RWY 18R/36L

NOTE-
During a crossing runway configuration or 8/26 flow, coordinate with Local Control for closed pattern assignments.

2-2-2. DEPARTURE FREQUENCY

a. Issue the appropriate departure frequency as follows:

1. Assign the departure frequency associated with the de-combined airspace into which the aircraft will initially enter or, if positions are combined, you may assign the frequency of the position where the airspace is combined.

2. Assign RSW frequency to VFR props enroute to RVS when TUL is in a straight South, straight West, or crossing South/West flow.

2-2-3. STRIP MARKING

Prepare flight progress strips in accordance with the following:

1	5	8	9	9B	10	11	12
2	6				13	14	15
3							
4	7		9A	9C	16	17	18

TBL 2-2-1

a. NAS IFR:

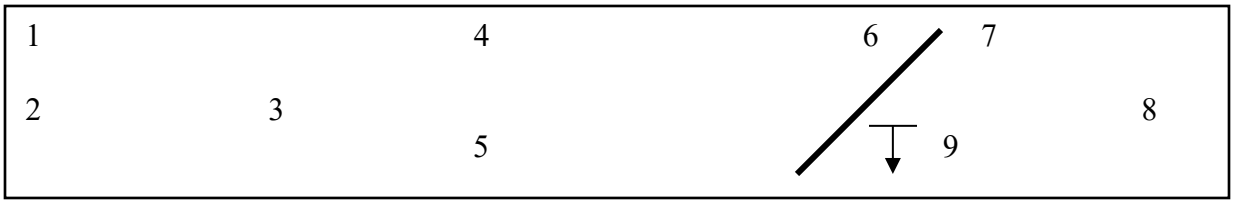
Block 3: Checkmark indicating multiple aircraft in flight has been entered into STARS.
Block 8: Sector symbol into which the aircraft will initially enter, and abbreviated frequency when the issued frequency is different from the airspace sector.
Block 9: Emphasize destination when affected by flow control.
Block 9A: Circle FRC if noted in remarks.
Block 9B: Assigned altitude.
Block 10: PDC or a check mark to indicate the means the clearance was issued.
Block 12: ATIS code (if pilot has the ATIS).
Block 16: TMU release time (2 or 4 digit), or "RLS" if no time is given.
Block 17: TMU void time (2 or 4 digit) or if no void time, leave blank.

b. Local IFR and VFR-On-Top:

Block 1: ACID.
Block 3: Aircraft Type.
Block 5: Beacon Code.
Block 7: Final Altitude.
Block 8: Sector symbol into which the aircraft will initially enter, and abbreviated frequency when the issued frequency is different from the airspace sector.
Block 9: Clearance limit and route.
Block 9A: Special requests. (i.e. Practice Approaches or VFR-On-Top)
Block 9B: Assigned altitude.
Block 10: Checkmark indicating clearance was issued.
Block 12: ATIS code (if pilot has the ATIS).

c. SVFR and VFR:

Use the plain side or back side of a flight progress strip to complete the following:



TBL 2-2-2

Block 1: ACID.
Block 2: Aircraft Type.
Block 3: Sector symbol into which the aircraft will initially enter, and abbreviated frequency when the issued frequency is different from the airspace sector.
Block 4: Beacon Code.
Block 5: Requested altitude.
Block 6: Requested heading or Destination, Coded Departure, or SVFR symbol and direction.
Block 7: ATIS code (if pilot has the ATIS).
Block 9: Assigned at or below altitude.

NOTE-
The slanted line between Block 6 and Block 9 may be omitted for SVFR flight progress strips.

d. NAS VFR:

Utilize the FDIO printed flight progress strip and mark according to the following:

1	5	8	9	9B	10	11	12
2	6				13	14	15
3							
4	7		9A	9C	16	17	18

TBL 2-2-3

Block 8: Sector symbol into which the aircraft will initially enter, and abbreviated frequency when the issued frequency is different from the airspace sector.
Block 9: VFR.
Block 9B: Assigned at or below altitude.
Block 10: Checkmark indicating clearance was issued.
Block 12: ATIS code (if pilot has the ATIS).

2-2-4. PROCESSING FLIGHT PROGRESS STRIPS

a. Retain flight progress strips in the strip bay at clearance delivery until clearance is issued, TMU release/void time is issued, or flight plan has timed out.

b. Forward issued Helicopter flight progress strips to Local Control and ensure that the pilot has the appropriate Local Control frequency.

c. Forward all other issued flight progress strips to Ground Control.

2-2-5. MISCELLANEOUS

Notify the TS/CIC upon notification of an emergency, bomb threat, or hijack.

2-2-6. PRE DEPARTURE CLEARANCE (PDC) PROCEDURES

a. Review clearances for accuracy and route integrity. If route is incorrect, issue the correct route verbally to the aircraft.

b. Include in the clearance climb-out procedures, altitude information, departure frequency and other air traffic control information as required in this order. This information is contained in selectable fields as follows:

1. Selectable Field 1 – climb-out procedures, mandatory
2. Selectable Field 2 – altitude information, mandatory
3. Selectable Field 3 – departure frequency, mandatory
4. Selectable Field 4 – other air traffic control information, optional

c. Ensure amendments to clearances are verbally relayed to the aircraft prior to departure. These amendments may be relayed through other operational positions in the Tower.

d. Monitor and forward routes that routinely receive PDRs to the Support Specialist.

Section 3. GROUND CONTROL (GC)

This section describes the duties and responsibilities of the Ground Control position. Ground Control must:

2-3-1. MOVEMENT AREAS

a. Control movement of aircraft, vehicles, equipment, and personnel on all airport movement areas, not designated as active runways, as depicted in the TUL/TAIT Delineation of Movement and Non-Movement Areas Letter of Agreement.

b. Maintain at the Ground Control position, the appropriate "Runway is Mine" strip for all runways not designated as active and under your control.

c. All coordination between Local Control and Ground Control pertaining to runway crossings, and entry into runway safety areas must be recorded on facility landlines. Coordination between Ground Control and the appropriate Local Control to activate or deactivate a runway must also be completed via recorded facility landlines.

d. Coordinate with the proper authority anytime a movement area opens/closes, before using the area for operations or releasing it to maintenance.

NOTE-

1. *Taxilanes NN, QQ, LA, and LZ are not visible from the tower.*

2. *There is an occasional radio blind spot in the run-up area for Runway 18R between the Runway 18R glideslope building and the north end of Taxiway M.*

3. *Common vehicle call signs used at TUL are listed in Appendix D.*

e. Utilize the special use areas as depicted in Appendix F.

f. Allow TAIT and Barrier Maintenance vehicles to remain on GC frequency when operating for short durations on an active runway after coordination with LC is completed.

g. Hold aircraft short of the RWY 8 safety area on TWY M when RWY 8 is active.

2-3-2. COORDINATION

a. Coordinate all opposite direction and non-advertised runway departures with LC.

b. Notify LC control of assigned runway for departure and intersection departures via strip marking.

c. Assign 2500' (VFR at or below 2500') and the appropriate departure control frequency to all jets and military fixed-wing aircraft taxied to a secondary runway (except RWY 26) during crossing runway operations. Change the departure tab list as appropriate and update the changes on the flight progress strip.

d. Assign 2500' (VFR at or below 2500') and the appropriate departure control frequency to all jets and military fixed-wing aircraft taxied to a non-advertised runway (except RWY 26), change the departure tab list as appropriate and update the changes on the flight progress strip.

e. When Runway 26 is not the "Primary" runway, assign 3,500' and the appropriate departure control frequency to all jets and military fixed-wing aircraft taxied to it for departure. Change the departure tab list as appropriate, and update the changes on the flight progress strip.

2-3-3. STRIP MARKING

Mark flight progress strips in accordance with the following:

a. NAS IFR,

Block 9C: Taxi Time for A/C affected by Call for Release (CFR). This time should be the actual time that the aircraft called for taxi.
Block 12: ATIS code or "WX" if weather information is issued.
Block 15: Runway assignment/Intersection (if intersection issued)

b. Local IFR, VFR-On-Top, and NAS VFR:

1	5	8	9	9B	10	11	12
2	6				13	14	15
3							
4	7		9A	9C	16	17	18

TBL 2-3-1

c. SVFR and VFR



Block 7: ATIS code or "WX" if weather information is issued.

Block 8: Runway assignment/Intersection (if intersection issued)

NOTE - *All fixed wing departures require a flight progress strip at GC.*

2-3-4. PROCESSING FLIGHT PROGRESS STRIPS

Forward the flight progress strip to the appropriate Local Controller after the aircraft has started taxiing.

2-3-5. PIREP'S

Relay PIREP's to Tower FLM/CIC for facility dissemination.

2-3-6. EMERGENCIES

a. Notify the TS/CIC upon receipt of an emergency situation.

b. Advise emergency equipment of landing runway for an emergency aircraft if not relayed during the alert notification.

c. Ensure emergency vehicles reach standby locations and the terminal in a timely manner when an emergency exists. Emergency equipment standby positions are located in Appendix G.

Section 4. LOCAL CONTROL (LC)

This section describes the duties and responsibilities of Local Control East (LCE) and Local Control West (LCW) positions. Local Control must:

2-4-1. GENERAL

a. Record all runway-crossing coordination between Local Control and Ground Control on facility landlines. All coordination between Ground Control and the appropriate Local Control activating or de-activating a runway must be completed via landline.

1. After GC coordinates a runway crossing, place the "RWY CROSSING" placard into the active traffic strip bay. After GC advises that the runway crossing has been completed, place the "RWY CROSSING" placard back into the in-active strip bay.

b. Be responsible for providing applicable IFR/VFR separation between arrivals and departures, successive departures, and between other traffic under respective LCE/LCW jurisdiction within tower's airspace as depicted in Appendix H.

c. Ensure initial separation prior to instructing departures to contact departure.

d. Have control of arriving aircraft within tower's airspace, provided the change does not affect subsequent arrivals.

e. Provide visual separation between aircraft executing approaches to crossing runways and advise the TRACON FLM/CIC when weather conditions do not permit the application of visual separation.

NOTE-
LC must not provide visual separation between aircraft when wake turbulence separation is required

f. Provide visual separation between arrival aircraft within Towers airspace when the reported ceiling is 2,500 feet or above and the reported visibility is 6 NM or greater, (also known as, Tower Assumes Responsibility (TAR)). Notify the TRACON FLM/CIC if visual separation becomes impractical.

g. Utilize/Maintain a pad of arrival traffic call signs as a memory aide for past, present and future operations.

1. <u>For landing aircraft,</u> place a checkmark next to the call sign – after the pilot acknowledges their landing clearance.

2. <u>For practice approach/pattern traffic,</u> place a circled "X" next to the call sign – after the pilot acknowledges the option clearance.

2-4-2. RADAR/STARS USAGE

a. Use the TDW for radar functions.

b. Ensure initial Radar Identification and STARS Acquisition for all TUL departures.

1. Ensure initial radar identification is accomplished IAW FAA JO 7110.65. Local Control is not required to inform the aircraft of "Radar Contact". The initial departure controller will inform the aircraft of "Radar Contact."

2. Ensure STARS acquisition and accuracy of a departure track has occurred prior to 3 miles from the departure runway. A manual hand off must be performed prior to exiting tower airspace if STARS acquisition has not been accomplished.

c. Utilize STARS Quicklook function for the transfer of radar identification and arrival information. Local Control must Quicklook the position(s) responsible for arrivals to TUL.

d. Notify TRACON FLM/CIC if, for any reason, use of the Quicklook function becomes unsatisfactory for air traffic purposes.

2-4-3. DEPARTURES –

IFR

a. **North/South Parallel Runway Flow (18L/R or 36R/36L):**

1. Have automatic releases for jet and military fixed-wing aircraft assigned runway heading up to 15,000'.

2. Have automatic releases for propeller-driven aircraft (other than military fixed-wing)/helicopter aircraft turned to a heading listed in Table 2-4-1, and must be assigned 2500'.

b. **Crossing Runway Flow:**

1. *Primary Runway:* Have automatic releases for jet and military fixed-wing aircraft assigned runway heading up to 15,000'.

2. *Secondary Runway:* Aircraft must be assigned 2500', except when Runway 26 is the secondary. When Runway 26 is the secondary runway, and aircraft is assigned runway heading, aircraft must be assigned 3500', unless otherwise assigned by Radar.

3. Have automatic releases for propeller-driven (other than military fixed-wing)/ helicopter aircraft turned to a heading listed in Table 2-4-1, and must be assigned 2500'.

APPROVED IFR HEADINGS

RUNWAY	SECTOR	HEADING	HEADING
18L/R	RW	230	
	RE	130	
36R/L	RW	310	
	RE	050	
8	RW	130	
	RE	050	
26	RW	230	
	RE	310	
8/18R	RW	130	210
	RE	050	
8/36L	RW	130	
	RE	310	050
26/18R	RW	130	230
	RE	310	
26/36L	RW	230	
	RE	310	030
36R/26	RW	230	310
	RE	030	
36R/8	RW	310	
	RE	050	130
18L/8	RW	210	
	RE	050	130
18L/26	RW	230	310
	RE	130	

TBL 2-4-1

NOTE 1 -
Local Control may assign props/helicopters runway heading and issue 15,000' or lower requested altitude at their discretion, provided the changes are marked on the flight progress strip.

c. **Non-Advertised Runways:**

1. When released by Radar, aircraft must be assigned 2500' - unless otherwise specified by Radar. ***EXCEPTION:*** Aircraft assigned runway heading off of Runway 26 must be assigned 3500' - unless otherwise specified by Radar.

d. **Alternate Tower-Initiated Headings:**

1. After coordinating with/approved by Radar, aircraft assigned other than Runway Heading must be assigned an altitude of 2500' – unless otherwise specified by Radar.

e. **TUL Departures to RVS**

1. Request release, from appropriate radar controller, for all IFR/VFR jets or twin turbo props inbound to RVS, when TUL is in a South and/or Runway 26 flow and RVS is in a south flow.

VFR

a. Have automatic releases for all props/helicopters off any runway provided the aircraft are turned so as to exit Towers' airspace into the appropriate Radar departures airspace on headings listed below. VFR jet aircraft must be assigned runway heading – unless otherwise coordinated.

1. VFR/SVFR:

(a) Straight North, South, East or West Flows: No further left or right of crossing runway and ensure the aircraft remain clear of crossing runways final approach course.

(b) Crossing Runway Flows: Headings that will ensure the aircraft remain clear of Radar Finals airspace.

(c) Straight South, straight West, or crossing South/West flow – RVS Arrivals: Heading 210

(d) Lunar Departures: Call for release on all Coded departures that enter Radar Finals airspace.

2-4-4. GO-AROUND/ MISSED APPROACH

IFR/VFR aircraft on practice instrument approaches or that otherwise plan to execute a missed approach/go-around will be assigned missed approach/climb-out instructions in accordance with paragraph 1-2-5c., or as otherwise verbally coordinated, prior to being instructed to contact Tower. Tower must provide appropriate wake turbulence and successive departure separation to these aircraft.

Handle aircraft that execute an unplanned missed approach or go-around in the following manner:

a. IFR Aircraft:

1. Issue 2,500' and assign a heading to insure course divergence of 30º or more from conflicting departure traffic – except for Runway 26, assign 3,500'.

2. Visual separation may be applied as authorized in FAA JO 7110.65 in lieu of 30º divergence as long as weather conditions permit.

3. Wake turbulence separation must be applied in all instances.

4. Verbally hand-off the aircraft to the appropriate radar sector.

5. Tower may elect to keep aircraft on a visual approach in the VFR Tower pattern. Verbal coordination with Radar Finals is required.

b. VFR Aircraft:

1. Follow procedures for a VFR departure, and

2. Verbally hand-off the aircraft to the appropriate radar sector, or

3. Tower may elect to keep the aircraft in the VFR Tower pattern.

2-4-5. TRANSFER OF CONTROL

Transfer control of departures to the receiving Radar position when the aircraft is 1 NM from the airport.

NOTE-
Course reversal by Radar is not authorized.

2-4-6. STRIP MARKING

Utilize a flight progress strip for all departures or coordinate with the appropriate Radar departure controller. Mark flight progress strips in accordance with the following:

1 2	5	8	9	9B	10	11	12
3	6				13	14	15
4	7		9A	9C	16	17	18

TBL 2-4-2

a. NAS IFR:

Block 4: Write a large “D” next to CID if departure time in Block 18 is more than 20 minutes past Taxi Time, and advise the Tower FLM/CIC of the delay.
NOTE**:** 20 minutes includes the 15 minutes of delay tracking time, plus 5 minutes of standard time needed for aircraft to taxi to departure runway.
Block 9: Write ‘H’ and heading issued to props.
Block 9B: Update altitude assignments as necessary.
Block 18: Actual airborne time for A/C affected by CFR Programs.

b. Local IFR, VFR-on-Top:

Block 9A: Write ‘H’ and heading issued to props.

c. NAS VFR (see TBL 2-4-2):

Block 9: Circle destination or LOA route when on course has been issued.
Block 9A: Write ‘H’ and heading issued to props, if other than in Block 9.



TBL 2-4-3

d. VFR:

Block 6: Circle destination, direction of flight, or LOA route when on course has been issued.
Block 6A: Write ‘H’ and heading issued to props, if other than in Block 6.

2-4-7. PROCESSING FLIGHT PROGRESS STRIPS

Drop flight progress strips in the drop tube as a nonverbal rolling/boundary notification to the Radar departure controller. Utilize a verbal rolling/boundary notification, or Radar Handoff, to the Radar departure controller when a flight progress strip is not available.

2-4-8. MISCELLANEOUS

a. Not delay aircraft already on departure roll or airborne when a TMU message is received that effects that aircraft.

b. Keep arriving/departing helicopters on frequency while taxiing after coordinating the operation with Ground Control. Advise Ground Control when the operation is complete.

c. Ensure local tower traffic count operations for each hour are entered into the Daily Traffic Count Log (DTCL).

d. Activate the STARS “Vehicle On Runway” entry (F7, P, V) or STARS Map 51, whenever a vehicle is authorized to be on an active runway.

e. Have in their possession the “RUNWAY CLOSED” strip anytime a runway is closed.

2-4-9. PIREP's

Relay PIREP's to Tower FLM/CIC for facility dissemination.

2-4-10. EMERGENCIES

a. Advise the TS/CIC upon receiving information of an emergency.

b. Consider a runway to be closed after an emergency aircraft has landed. Emergency vehicles and Airport Operations follow immediately behind emergency aircraft after they land. Airport Operations will complete a FOD check and notify the tower when the runway reopens.

2-4-11. SPLIT LOCALS

During periods that Local Control is combined all duties associated with each controller is combined as well. Local Control must be combined during crossing runway operations. Individual duties of Local Control East and Local Control West are described below.

a. Local Control East (LCE) must:

1. Be responsible for operations on Runway 18L/36R. Be the primary controller for individual operations on Runway 8/26 after coordination with Ground Control and Local Control West.

2. Take tower visibility observations and forward to FD for dissemination.

3. Ensure Runway Configuration on the ITWS is set correctly.

4. Coordinate with Radar for the use of the SFO pattern when the initial request is made with Tower. Advise Radar the direction of SFO pattern during Runway 8/26 operations. Advise Radar when the SFO pattern is no longer in use.

5. Protect the intersection of Taxiway F, and the Terminal Ramp during Runway 18L operations when advised by Ground Control.

6. Coordinate all West prop/helicopter departures with Local Control West.

b. Local Control West (LCW) must:

1. Be responsible for operations on Runway 18R/36L.

2. Coordinate all East departures with Local Control East.

3. Coordinate all IFR aircraft departing runway heading with Local Control East.

4. Coordinate with Local Control East and Ground Control for the use of Runway 8/26.

Section 5. CAB COORDINATOR (CC)

This section describes the duties and responsibilities of the Cab Coordinator position. Cab Coordinator must:

2-5-1. COORDINATION

a. Assist the Local Control positions by accomplishing prescribed coordination and aiding in STARS data entries.

b. Be authorized to approve/disapprove the use of non-advertised runways for arrivals/departures.

c. Be authorized to approve/disapprove requests for practice approaches to non-advertised runways.

d. Assist the Local Control positions in obtaining IFR releases.

e. Ensure that all jets, and military fixed-wing aircraft are assigned 2,500' (VFR at or below 2500'), when departing the secondary runway in crossing runway operations, and when Runway 26 is the secondary runway, coordinate with the departure controller for an altitude at or above 3,500'(VFR at or below 3500') or a turn. Ensure altitude changes are written on flight progress strips.

2-5-2. PIREP'S

Relay PIREP'S to Tower FLM/CIC facility dissemination.

Chapter 3. TRACON

Section 1. RADAR DATA (RD)

This section describes the duties and responsibilities of the Radar Data position. Radar Data must:

3-1-1. STRIP MARKING

Prepare flight progress strips in accordance with the following:

1	5	8	9	9B	10	11	12
2	6				13	14	15
3							
4	7		9A	9C	16	17	18

a. Secondary airports if clearance is issued by TUL:

Block 9B: Assigned altitude.
Block 10: Checkmark indicating clearance was issued.
Block 16: Release time.
Block 17: Void time.
Block 18: If not off by advisory time.

3-1-2. PROCESSING FLIGHT PROGRESS STRIPS

a. Deliver overflight, secondary airport, SIGMET, AIRMET, and Center Weather Advisory strips to the appropriate position based on airspace configuration. Post strips on the left side of the Radar position.

b. Forward NAS Status messages and TMU messages to the FLM/CIC.

c. Discard non-essential flight progress strips.

3-1-3. MISCELLANEOUS

a. Coordinate with the Radar position for clearance information and release for IFR departures off of secondary airports and issue the clearance to the pilot or Flight Service Station.

b. Call TMU for release of aircraft affected by flow control off secondary airports.

NOTE-
When RVS Tower is open, they are responsible for obtaining releases for any IFR aircraft affected by flow control.

c. Relay flight plan information to RVS ATCT as soon as possible after flight plans become available when RVS FDIO is inoperative.

d. Make FDIO entries as required/requested by Radar positions.

e. Distribute SIGMET's, AIRMET's and CWA's to all affected TRACON positions. SIGMET's, AIRMET's and CWA's are received via the FDIO.

Section 2. RADAR SECTORS

This section describes the duties and responsibilities of Radar West (RW) and Radar East (RE) positions. Radar Sectors must:

3-2-1. GENERAL

a. Be responsible for the control of traffic within the airspace delegated to them as depicted in Appendix H.

b. Resolve conflicts and provide initial spacing of arrivals prior to transfer of control to final/satellite airspace.

3-2-2. DEPARTURES – TRANSFER OF CONTROL

Have control for departures off of TUL when aircraft are 1 NM from the airport. Course reversal is not authorized without prior coordination.

3-2-3. ARRIVALS

a. Handoff IFR aircraft to RF:

1. Aircraft 5,000’ or above = at an altitude no lower than 5,000’.

2. Aircraft below 5,000’ = 4,000’ and below.

b. Handoff VFR aircraft to RF at or descending to an altitude no lower than 500’ above underlying airspace.

c. Transfer control of aircraft to RF for turns and descent within 20 miles of TUL airport. IFR aircraft at or above 4,000’ on downwind, must remain at or above 4,000' MSL until in RF airspace. Course reversals are not authorized.

3-2-4. COORDINATION

a. Coordinate with RF, for arrival sequence when vectoring an aircraft for any approach to a non-advertised runway, unless the aircraft is a practice approach and will not affect the arrival sequence.

b. Coordinate with RF and LCE/W, all non-advertised runway approaches that will terminate with a full stop on the non-advertised runway or is assigned runway heading on missed approach.

c. Coordinate with each RADAR position involved regarding aircraft requesting a published high altitude approach. This coordination must be accomplished prior to issuing the approach clearance or initiating a RADAR hand-off to another RADAR controller.

d. Advise affected RADAR positions when the SFO Pattern has been coordinated and approved with LCE.

e. Coordinate with LCE for approval of a straight-in SFO before issuing the SFO clearance or before handing the aircraft off to RF.

NOTE-
Overhead SFO's are coordinated with LCE via scratch pad. The SFO pattern belongs to LC until they advise the pattern is clear.

3-2-5. RADAR SATELLITE(S)

a. Handoff IFR aircraft to RSW/RSE, at or descending to an altitude 1,000' above RSW/RSE airspace. VFR aircraft may be handed off at any altitude.

b. Transfer control of aircraft to RSW/RSE for turns and descent within 20 miles of RVS airport. Course reversals are not authorized.

c. Have control of aircraft handed off from RSW/RSE when aircraft are at or above 2,500' and 3 NM or more from RVS airport.

NOTE-
When Radar Satellite(s) are closed, RW assumes their airspace, and the duties and responsibilities associated with each position.

3-2-6. STRIP MARKING

Place a checkmark next to the PDR/PAR on overflight progress strips when the PDR/PAR has been issued.

3-2-7. PIREP's

Relay PIREP's to the TRACON FLM/CIC for facility dissemination.

3-2-8. EMERGENCIES

Advise the TRACON FLM/CIC upon receiving information of an emergency.

Section 3. RADAR FINAL

This section describes the duties and responsibilities of Radar Final (RF) and ASR (ASR) positions. Radar Final must:

3-3-1. GENERAL

a. Be responsible for the control of traffic within the airspace delegated to them as depicted in Appendix H.

b. Establish and control arrival sequence to TUL.

c. Use altitude separation when vectoring aircraft to final on opposing base legs until approved separation is established with an approach clearance or appropriate application of visual separation is applied.

NOTE-
RF may be combined with any sector. When RF is combined with any other sector, all handoffs, point-outs and other coordination, will be accomplished IAW FAA JO 7110.65, Chapters 2 and 5.

3-3-2. COORDINATION

a. Utilize STARS Quick-look function for the transfer of radar identification and arrival information to LCE/LCW. Manually hand-off non-tracked aircraft. The minimum information contained in arrival data blocks must be:

1. Aircraft Identification.

2. Type of approach, landing runway, and missed approach or climb-out instructions issued (if applicable).

3. Type Aircraft.

b. Utilize STARS scratch pad information to coordinate practice approaches and climb-out/missed approach instructions.

c. Ensure correct scratch pad entries are made prior to the aircraft being turned onto the final approach course.

3-3-3. TRANSFER OF CONTROL/COMMUNICATIONS

a. Accomplish transfer of communications of arrivals to Tower prior to the aircraft entering Tower airspace, or not later than 7 flying miles from the airport, whichever comes first.

b. Have control of aircraft handed off from RW/RE for turns and descent within 20 miles of TUL airport. IFR aircraft on downwind may be descended no lower than 4,000' until within RF airspace.

c. Have control of aircraft handed off from RSW/RSE for turns toward their airspace when the aircraft are at or above 2,500'.

3-3-4. PIREP's

Relay PIREP's to the TRACON FLM/CIC for facility dissemination.

3-3-5. EMERGENCIES

Advise the TRACON FLM/CIC upon receiving information of an emergency.

3-3-6. ASR Position – ASR APPROACHES

The ASR Position has no airspace associated with it. ASR must:

a. Be responsible for the duties listed in paragraphs 3-3-2 through 3-3-5 above.

b. Coordinate with RF, or appropriate Radar Sector for the use of airspace and for approach sequence of ASR aircraft.

c. Verbally coordinate ASR approaches by advising LC of aircraft intentions and receiving landing/option clearance prior to 5 miles from the runway threshold.

d. Instruct ASR aircraft to contact GC when landing roll is complete or the appropriate radar sector on climb-out.

Section 4. RADAR SATELLITES

This section describes the duties and responsibilities of Radar Satellite West (RSW) and Radar Satellite East (RSE) positions. Radar Satellites must:

3-4-1. GENERAL

a. Be responsible for the control of traffic within the airspace delegated to them as depicted in Appendix H.

b. When only one satellite position is open, it assumes the duties and responsibilities of the other satellite position.

c. When neither RSW nor RSE is staffed, RW assumes the duties and responsibilities of both positions.

d. Have control for departures off of RVS when aircraft are 3 NM from the airport. Course reversals or turns back into the departure corridors are not authorized without prior coordination.

e. Provide traffic advisories to participating Basic Radar service departures off RVS.

3-4-2. ARRIVALS

a. Be responsible for the arrival sequence as follows:

1. RSW:

(a) Establish an arrival sequence for Runways 19R, 1L, 13, and straight in for Runway 19L.

(b) Coordinate with RSE for arrival sequences to Runway 1R, and 31.

(c) Be responsible for the sequence of all IFR arrivals to RVS.

2. RSE:

(a) Establish an arrival sequence for Runways 1R, 31, and downwinds to Runway 19L.

(b) Coordinate with RSW for arrival sequences to Runway 19R, 1L, 13, and straight in to Runway 19L.

(c) Coordinate with RSW all IFR arrivals and VFR practice approaches to RVS.

(d) For IFR separation purposes, protect the ILS final approach course by 3 NM.

(e) Coordinate IFR GPS approaches to OKM with ZFW.

NOTE-
Because of limited Radar coverage, there is no way to guarantee that aircraft executing the OKM RNAV (GPS) RWY 18 published missed approach will remain entirely in TUL airspace.

b. Ensure arrival information via scratch pad entries are made according to the TUL/RVS LOA.

3-4-3. TRANSFER OF CONTROL

a. Handoff IFR/VFR aircraft landing at TUL to RF at any altitude. RF has control for turns toward their airspace when the aircraft is at or above 2,500'.

b. Handoff IFR/VFR aircraft to RW/RE at an altitude within satellites airspace limits. RW/RE have control for turns and climbs when aircraft are at or above 2,500' and 3 NM or more from RVS airport.

c. Have control for turns and descent for aircraft handed off from RW/RE/RF when the aircraft is within 20 NM of RVS airport.

d. Have control of departures off of TUL within LCW airspace when aircraft are 1 NM from the airport.

3-4-4. PIREP's

Relay PIREP's to the TRACON FLM/CIC for facility dissemination.

3-4-5. EMERGENCIES

Advise the TRACON FLM/CIC upon receiving information of an emergency.

Section 5. RADAR COORDINATOR

This section describes the duties and responsibilities of the Radar Coordinator (RCW, RCE, RCS, RCF, ROC) positions. Radar Coordinator must:

3-5-1. COORDINATION

a. Assist in making/accepting manual/automated RADAR hand-offs.

b. Assist in making STARS entries.

c. Assist in strip marking.

d. Assist in regulating traffic flow with other positions and adjacent facilities.

e. Assist in necessary verbal coordination.

f. Be authorized to assist other control positions if needed.

Chapter 4. Front Line Manager (FLM)/Controller-In-Charge (CIC)

Section 1. Tower FLM/CIC

This section describes the duties and responsibilities of the Tower FLM/CIC position. Tower FLM/CIC must:

4-1-1. DUTIES

a. Complete Watch Checklist for Tower at 0000, 0800, and 1600L daily.

b. Be responsible for emergency alert notifications.

c. Designate the flow and/or crossing runway configuration.

d. Ensure that airport lighting (runway/taxiway) is activated 30 minutes prior to sunset.

e. Ensure that the SIA data is current and correct ATIS code is broadcast.

f. Ensure delay reports are forwarded to FLM/CIC for entry into OPSNET, as soon as practical.

g. Ensure additional required equipment checks are made as prescribed in TUL 7210.3.

h. Check MSAW volume levels on STARS. (F7 Z A)

i. Ensure the SWS Ribbon Display is set to the current runway configuration.

j. Forward PIREP information to TRACON/CIC for dissemination.

k. Provide oversight in the Enhancement of Controller Duties as follows:

1. Scanning: Always be alert to what is going on at the local and ground positions. Be a second pair of eyes and ears for the local and ground controllers. Ensure that the controllers continuously scan the active runways and movement areas prior to issuing landing or takeoff clearances and taxi instructions. Be continuously alert for unusual situations, i.e., unreported aircraft in the traffic pattern or in the final approach or departure path. When you observe that the instructions issued to vehicles or aircraft are not being adhered to, alert the controller.

2. Manage the operational environment with a goal toward eliminating distractions. The operational environment is identified as the Tower Cab and the TRACON room, excluding the FLM office and the AT Coach Lab.

a. Create a culture necessary to maintain the highest levels of system efficiency and capacity without diminishing safety. Reading non-operational material on position must never be condoned, and non-operational reading material must be kept out of operational areas.

b. Except in an emergency, cell phones must be powered off and never used in the operating quarters.

c. Administrative duties must not be performed in the operating quarters by the FLM/CIC. Examples of administrative duties are:

i. Conducting tours

ii. Reading/responding to email

iii. Creating watch schedules

iv. Writing skill check/OJT reports/Training Team documentation, etc.

v. Conducting non-operational telephone calls

vi. Conducting investigations

vii. Conducting Team Briefings or Performance Management discussions, i.e. training team discussions, etc.

d. All administrative duties must be performed in the FLM office, conference room, or in the training area in the Staff offices.

3. Coordination: Ensure that controllers adhere to the provisions specified in FAA JO 7110.65 while coordinating control actions. Use of visual hand signals, head nods, etc., to indicate approval/disapproval of control actions should never be used. "Short Cut" procedures such as these tend to add complexity and often times cause confusion. Required coordination should be completed before the needed actions become urgent. Assist controllers when necessary to stay well ahead of situations. When discrepancies are noted, bring them to the controllers' attention.

4. Phraseology: Ensure that controllers use the proper phraseology when communicating and that:

(a) Phraseology is not too brief, such as dropping the prefix and type of aircraft.

(b) A moderate speech rate is used to avoid unnecessary repeats.

(c) Improvised phraseology is used only when necessary.

(d) Non-standard phraseology is challenged when noted.

l. Proficiency/Remedial Training (FLM Only). Training must be completed in accordance with the National and Local Training Orders. When it is noted that required training has not been completed as specified, take action to see that affected personnel are made aware and that the required actions are taken.

m. Refer to APPENDIX B, Facility Position Checklist, paragraph j. Runway Change Checklist, when initiating a runway change.

n. Ensure that the Airport Closures/Openings are updated on the Automated Airport Closures Map.

o. Relay PIREP'S to the TRACON FLM/CIC for dissemination.

Section 2. TRACON FLM/CIC

This section describes the duties and responsibilities of the TRACON FLM/CIC position. TRACON FLM/CIC must:

4-2-1. DUTIES

a. Complete Watch Checklist for TRACON should normally be completed by 0000, 0800, and 1600L daily.

b. Check MSAW volume level on STARS. (F7 Z A)

c. Monitor traffic flow and implement flow control when necessary.

d. Combine/de-combine positions of operation as required by staffing and traffic demand. Update the IDS-4 reflecting status of Radar Satellites and Radar Final positions.

e. Monitor the operation of the STARS and ensure that the system is operating satisfactorily.

f. Report all malfunctions and/or discrepancies to MOCC and make appropriate entry on 7230-4, Facility Log.

g. Advise Flight Data when conditions requiring the solicitations of PIREP's are forecasted for the Tulsa area.

h. Notify the Radar Sectors, when advised by Flight Data, that PIREP's need to be solicited. Enter all PIREPs received into the AIS-R system. If there are issues that would preclude a timely entry, the PIREPs may be forwarded to Kansas City ARTCC FDU for dissemination. Disseminate all PIREPs forwarded by Tower to appropriate TRACON positions.

i. Obtain current forecasts for icing and turbulence from FTW AFSS at the start of the watch.

j. Maintain the NOTAM binder and ensure all pertinent NOTAM's are updated, summarized, and when necessary make entries in the IDS-4.

k. Ensure the IDS-4 is up to date with current equipment/NAVAID outages and NOTAM's.

l. Enter delay reports into OPSNET, for A/C with delays of more than 15 mins.

m. Collect flight progress strips as necessary. Bundle strips for the preceding day and record the date on the bundle.

APPENDIX A

n. Ensure the current ATIS code for TUL and RVS are broadcasted at each position.

o. Notify CD and RVS when departure gates become unusable due to weather.

p. Provide oversight in the Enhancement of Controller Duties as follows:

1. Scanning: Always be alert to what is going on in the TRACON. Open/close positions as traffic warrants; positions should be opened before it is "too late." Be continuously alert for unusual situations, i.e., low altitude alerts, conflict alerts, emergency beacon codes, ELT's, etc. Assist controllers when necessary, especially when you observe aircraft not adhering to instructions issued by the controller. Be aware of the total TRACON environment; be an extra set of eyes and ears for positions of operation.

2. Manage the operational environment with a goal toward eliminating distractions. The operational environment is identified as the Tower Cab and the TRACON room, excluding the FLM office and the AT Coach Lab.

a. Create a culture necessary to maintain the highest levels of system efficiency and capacity without diminishing safety. Reading non-operational material on position must never be condoned, and non-operational reading material must be kept out of operational areas.

b. Except in an emergency, cell phones must be powered off and never used in the operating quarters.

c. Administrative duties must not be performed in the operating quarters by the FLM/CIC. Examples of administrative duties are:

i. Conducting tours

ii. Reading/responding to email

iii. Creating watch schedules

iv. Writing skill check/OJT reports/Training Team documentation, etc.

v. Conducting non-operational telephone calls

vi. Conducting investigations

vii. Conducting Team Briefings or Performance Management discussions, i.e. training team discussions, etc.

d. All administrative duties must be performed in the FLM office, conference room, or in the training area in the Staff offices.

3. Coordination: Ensure that controllers adhere to the provisions specified in FAA JO 7110.65 while coordinating control actions. Use of visual hand signals, head nods, etc., to indicate approval/disapproval of control actions should never be used. "Short Cut" procedures such as these tend to add complexity and often times cause confusion. Required coordination should be completed before the needed actions become urgent. Assist controllers when necessary to stay well ahead of situations. When discrepancies are noted, bring them to the controllers' attention.

4. Phraseology: Ensure that controllers use the proper phraseology when communicating and that phraseology is not too brief, such as dropping the prefix and type of aircraft; Moderate speech rate is used to avoid unnecessary repeats; Improvised phraseology is used only when necessary; and that non-standard phraseology is challenged when noted.

q. Proficiency/Remedial Training (FLM Only). Training must be completed in accordance with the National and Local Training Orders. When it is noted that required training has not been completed as specified, take action to see that affected personnel are made aware and that the required actions are taken.

r. Each night, ensure that the Pre-Duty Weather Briefing Log is collected, and held for the next day. Print and date the next day's Pre-Duty Weather Briefing Log, and post it at the sign-in/off area for Mid-shift/next day personnel.

s. Each morning, attach previous day's weather briefing log to the previous day's 7230-4.

t. At the end of each month, the FLM/CIC must check the Currency Dashboard via CEDAR to ensure that all operational personnel have met monthly currency requirements. If it is determined that a controller has not met such requirements, the FLM/CIC that identified the lapse, must then notify that controller's FLM of record. The identified controller must not work another control position until being re-certified by a FLM.

u. Notify both TAIT and MOCC of any facility maintenance issues, and enter details into the daily 7230-4 Facility Log.

v. Check and disseminate GENOTs to all operational personnel on that shift on weekends and holidays.

w. In the event that TUL ATCT cannot provide ATC services to airport users due to an equipment malfunction, or tower evacuation, local control frequency 121.2 will be designated as the common traffic advisory frequency (CTAF). The CTAF will be added too and broadcast on the ATIS. A NOTAM will be filed with the Automated Flight Service

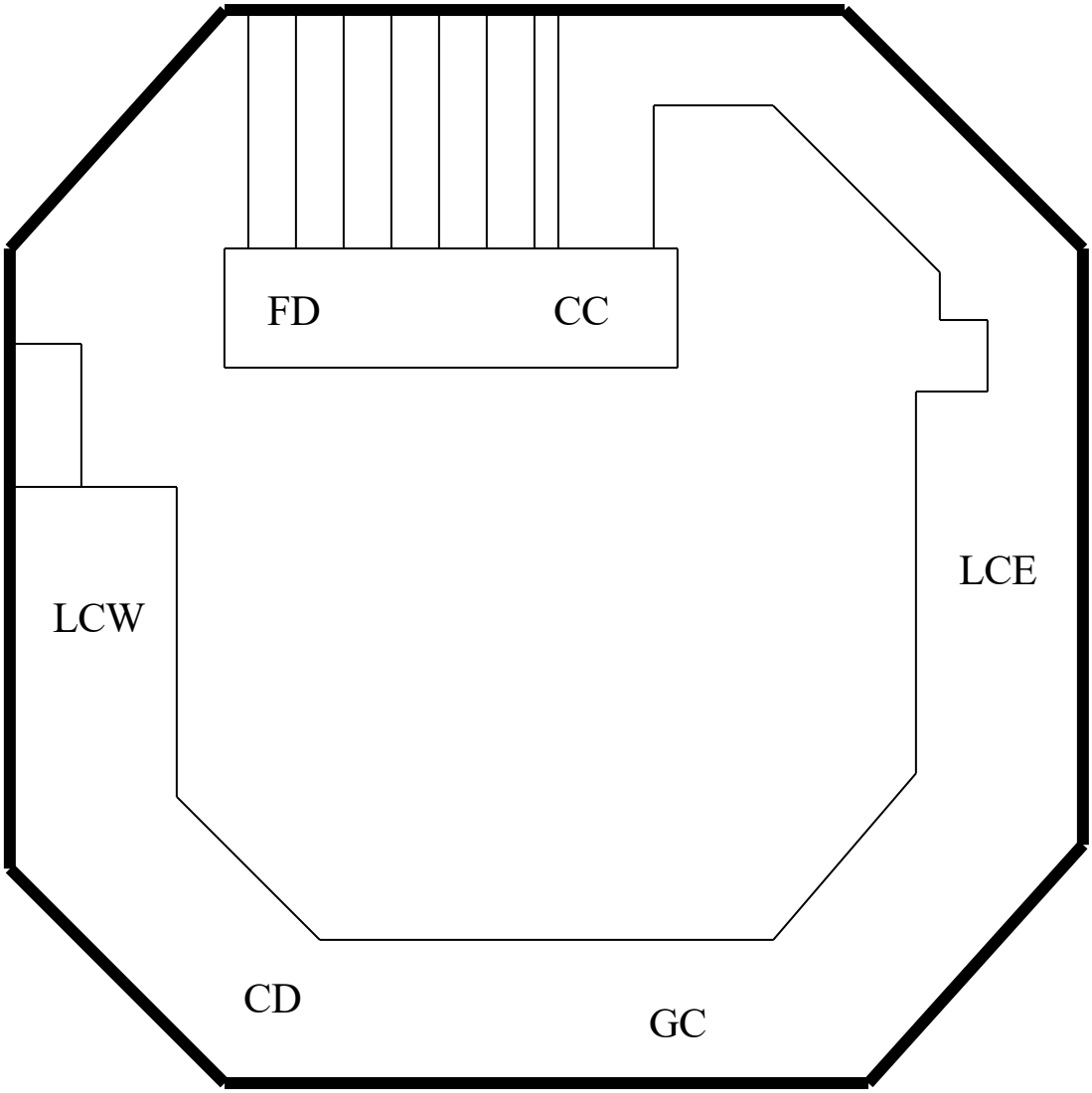
Station (AFSS) by calling 1-877-487-6867 on the tower closure. If TUL ATCT is unable to provide class C services the information will be added too and broadcast on the ATIS. A NOTAM will be filed with the AFSS.

Examples NOTAMS:

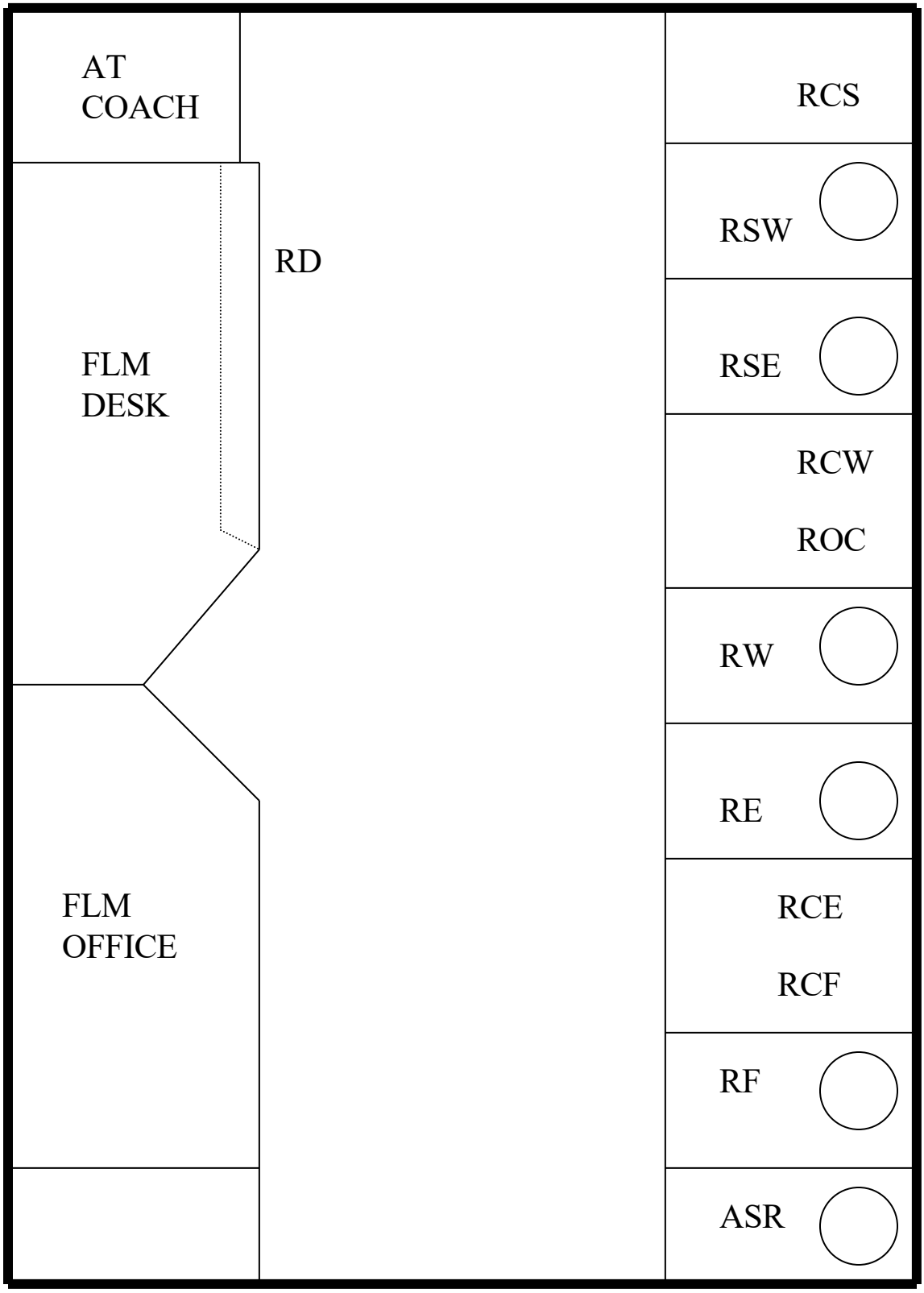
- TUL TWR CLSD TWR 121.2 NOW CTAF (must have a beginning & end times)
- ZKC TUL APP U/S CLASS C SERVICE NOT AVBL CTC KANSAS CITY ARTCC ON 127.8 (must have a beginning & end times)

APPENDIX A. Facility Layout

a. Tower Cab Layout:



b. TRACON Layout



APPENDIX B. Facility Checklists

a. Flight Data/Clearance Delivery:

1. SIA
2. NOTAMS
3. Equipment Status/Outages
4. Airport Conditions/Runway Status (OPEN/CLSD)
5. Weather/PIREP's/SIGMETs/Trends/RVR
6. Flow Control/Delays
7. Special Activities/Restrictions
8. Sector Configuration
9. Traffic
    - A. Aircraft Standing by for Clearance
    - B. Aircraft Requiring Release
    - C. Aircraft Released with Void Times
    - D. Communication Status of Each Aircraft

b. Ground Control:

1. SIA
2. NOTAMS
3. Equipment Status/Outages
4. Airport Conditions
    - A. Snow Removal/Mowing
    - B. De-icing
    - C. ILS Critical Area (<800/<2)
5. Runway Status
    - A. Available/Closed/Occupied/Released to GC
6. Traffic
    - A. At the Runway
    - B. Taxiing
    - C. Run-ups
    - D. Airport/Safety/Maintenance Vehicles
    - E. Void Times/Delay Holding
    - F. Communication Status of Each Aircraft

c. Local Control East and West:

1. SIA
2. NOTAMS
3. Equipment Status/Outages
4. Airport Conditions
    A. Snow Removal
    B. ILS Critical Area (<800/<2)
5. Runway Status
    A. Available/Closed/Occupied/Released to GC
6. Weather/SIGMETS/PIREP'S/Trends/RVR
7. Radar Sector Configuration
8. Traffic
    A. Point-outs
    B. Restrictions/Released/Void Times
    C. Vehicle on Runway
    D. Pending
    E. Actual
    F. TAR
    G. Communication Status of Each Aircraft

d. Cab Coordinator:

1. SIA
2. NOTAMS
3. Runway Status
    A. Active
    B. Used By GC
    C. Closed
4. Airport Conditions
    A. Airport/Safety/Maintenance Vehicles
    B. Snow Removal/Mowing
    C. De-icing
    D. ILS Critical Area (<800/<2)
5. Weather/SIGMETS/PIREP'S/Trends/RVR
6. Radar Sector Configuration
7. Traffic
    A. Point-outs
    B. Restrictions/Release/Void Times
    C. Vehicle on Runway
    D. Pending
    E. Actual
    F. TAR
    G. Communication Status of Each Aircraft

e. All Radar Positions (RW/RE/RSW/RSE/RF/ASR):

1. SIA
2. NOTAMS
3. Equipment Status/Outages
4. Airport Conditions/Runway Status
5. Weather/SIGMETS/PIREP'S/Trends/RVR
6. Coordination
    A. RW/RE DnD/LOA
    B. RF/ASR
    C. RSW/RSE
    D. Other
7. Positions Open/Combined
8. Traffic
    A. Special Activity Aircraft
    B. Point-outs
    C. Released, Not Airborne
    D. Pending
    E. Actual
    F. Practice Approaches – Approach Being Vectored
    G. TAR
    H. Communication Status of Each Aircraft

f. All Radar Coordinator Positions (RCW/RCE/RCS/RCF/ROC):

1. SIA
2. NOTAMS
    A. Tulsa
    B. Satellite
3. Equipment Status/Outages
4. Airport Conditions/Runway Status
5. Weather/SIGMETS/PIREP'S/Trends/RVR
6. Flow Control
7. Coordination: LOA/DnD/etc.
8. Sector Configuration
9. Traffic
    A. Special Activity Aircraft
    B. Pending
    C. Actual
    D. TAR
    E. Communication Status of Each Aircraft

g. Radar Data:

1. SIA
2. NOTAMS
3. Equipment Status/Outages
4. Weather/SIGMETS/PIREP'S/Trends/RVR
5. Flow Control
6. Coordination: LOA/DnD/etc.
7. Sector Configuration
8. Traffic
    A. Aircraft Standing By For Clearance
    B. Aircraft Standing By For Release

h. FLM/CIC TRACON/Tower Checklist:

1. SIA
    A. Configuration/Runway Status/TAR
    B. Current & Forecast Weather
    C. PIREP'S
    D. NOTAMS
    E. Special Activities
    F. Equipment & NAVAID Status
    G. Communication Status of Special Aircraft
    H. Delay Info
2. Staffing (Tower/Radar)
    A. Positions Staffed
    B. Training
    C. Leave Requests
    D. Overtime
    E. Other Duties
    F. T&A Status
3. ATIS Monitored for Accuracy

i. RVS OPENING/CLOSING (TUL Briefing Items):

1. NOTAMS
2. TUL Equipment Status
    A. NAVAIDS
    B. RADAR
    C. IDS-4
    D. Ground Frequency
3. Weather/Altimeter (Trends)
4. Traffic (Known)
    A. IFR Departures
    B. IFR Arrivals
    C. VFR

j. RUNWAY CHANGE CHECKLIST

TOWER. The Tower FLM/CIC is responsible for initiating the runway changes at TUL and ensuring the following checklist items are complete:

1. Coordinate with TRACON FLM/CIC.
2. Advise all Tower controllers of the runway change.
3. Coordinate last arrival and departure with TRACON FLM/CIC.
4. Select ILS for the appropriate runway.
5. Select the appropriate airfield lighting for the runway in use (Runway lights, MALSR, REILs, etc.).
6. Change ITWS configuration.
7. Obtain automatic releases from TRACON FLM/CIC.

TRACON. The TRACON FLM/CIC is responsible for ensuring the following checklist items are complete:

1. Coordinate with the Tower FLM/CIC to determine the most advantageous time to transition from one runway configuration to another.
2. Advise all TRACON controllers of the runway change.
3. Coordinate with appropriate control positions the call signs of the last arrival and departure at TUL.
4. Coordinate with RVS as appropriate.
5. Coordinate the release of departures with all effected TRACON positions and advise the Tower when to release departures.
6. Advise ZKC and ZFW of the new runway configuration.
7. Ensure STARS configuration is complete.
8. Log entry on the 7230-4.

k. TRACON OPENING/CLOSING CHECKLIST

TRACON Closing

1. Send Control of the ASR-9 to the Tower.
2. Forward phone to Tower.
3. Call ZKC TMU (05 on ZKC dial line) have them put TUL FDIO in a night-time configuration.
4. Configure STARS for midnight operation. (F7C 5)
5. Ensure FD position is not call forwarded and the speaker is turned up.
6. Make 7230-4 entry when Radar Operations are sent to the Tower.

TRACON Opening

1. Acquire control of ASR-9 from Tower.
2. Take phone off of call-forwarding.
3. Call ZKC TMU (05 on ZKC dial line) have them put TUL FDIO in a daytime configuration.
4. Configure STARS for daytime operations and combine keyboards as appropriate.
5. Make 7230-4 entry when Radar Operations resume in the TRACON.

l. RUNWAY OPENING/CLOSING CHECKLIST

TOWER. The Tower FLM/CIC is responsible for ensuring the following checklist items are complete:

1. Coordinate with TRACON FLM/CIC.
2. Coordinate with Airport Operations.
3. Advise all Tower positions of Runway status.
4. Ensure ATIS and SIA reflect Runway status.
5. Select appropriate ILS.
6. Select appropriate airfield lighting. (Runway lights, ALS, REILs, PAPIs, etc.)
7. Ensure that the Local and Ground positions display the appropriate "RWY CLOSED" strip indicating when Runways are closed.
8. Update Automated Airport Closures Map.

TRACON. The TRACON FLM/CIC is responsible for ensuring the following checklist items are complete:

1. Advise all radar positions of Runway status.
2. Make entry on the daily facility log (FAA Form 7230-4).

m. WATCH CHECKLISTS

TOWER.

1. Radio transmitters and receivers. (day shift)
2. Battery powered transceivers. (Monday - day shift)
3. STARS TDW displays.
4. Emergency phones. (Daily 0800L)
5. ILS/OM monitor panels.
6. Approach light monitor.
7. Arresting gear monitor panel.
8. Emergency jacks on backup transmitters and receivers. (day shift)
9. Complete a visual inspection and aural test of the MSAW speakers. (F7, ZA)
10. Light gun.
11. Notify FLMIC/OCIC when checks are complete.

TRACON.

1. Acquire control of ASR-9 from Tower.
2. Radio transmitters and receivers. (Monday - day shift)
3. Emergency frequency checks 121/5 and 243.0. (day shift)
4. Battery powered transceivers. (day shift)
5. DASI Comparison to ASOS, enter correction factor in IDS-4. (Monthly on first Monday)
6. Emergency jacks on backup transmitters and receivers. (day shift)
7. STARS configuration and Radar accuracy check.
8. Status Information Area for accuracy.
9. Verify NOTAM's with AFSS (day shift) or on-line via FAA Pilot Web.
10. Document DALR Check on FAA Form 7230-4. (Daily)
11. Complete a visual inspection and aural test of the MSAW speakers. (F7, ZA)
12. Ensure the Daily Spreader is completed and printed from WMT Schedule for the next day's business. (evening shift)
13. Send control of the ASR-9 to the Tower, if applicable. (evening shift)
14. Forward MITEL phone 6714 to Tower, if applicable. (evening shift)
15. Review "Operational Currency Dashboard" 1st day of the month.
16. Check and disseminate GENOTs for all operational personnel. (Weekends and Holidays)

APPENDIX C. Category II Abnormal Checklist

Component	Situation	CAT	Effect	Action Requirement
Localizer (LOC) and Glide Slope (GS)	One transmitter is inoperative. NOTE: 2 transmitters required to commence CAT II or CAT III operations.	I II III	No effect No effect if one transmitter fails during CAT II operations. See NOTE 1. Denies CAT III operations below RVR600 NOTE 1: Should weather improve to CAT I for at least four hours and subsequently deteriorate to CAT II/III conditions, standby equipment must be restored prior to resuming CAT II/III operations.	Corrective maintenance Expedite corrective maintenance The facility/organization responsible shall ensure that appropriate NOTAM action is taken, and expedite corrective maintenance.
Far Field Monitor (FFM) Sensor(s)	At least one sensor (receiver subsystem) operating & not in alarm	All	No effect	Corrective maintenance
	All sensors (receiver subsystems) inoperative or in alarm	All	If ILS critical areas are known to be clear, continue operations. Should weather improve to CAT I for at least four hours and subsequently deteriorate to CAT II/III conditions, FFM sensor(s) must be restored prior to resuming CAT II/III operations. (NOTE: FFM installation not required for CAT I operations; if installed, however, use the preceding text.)	Cat I -- Corrective maintenance Cat II & III -- Expedite corrective maintenance

NOTES:

(1) Where the action requirement is to inform the aircraft of the inoperative component situation, do so in accordance with the latest edition of Order 7110.65, Air Traffic Control, in paragraphs 4-70 *(4-6-1)*, Airport Conditions, and 3-32 *(3-3-3)*, Timely Information. Pilots will adjust minima/discontinue operations predicated on the inoperative component notification in accordance with the inoperative components table, the approved operations specifications, and/or Federal Aviation Administration (FAA) letter of authorization.

(1) Where the action requirement is to initiate a Notice to Airmen (NOTAM) to disallow the operation, do so in accordance with the latest edition of Order 7930.2, Notices to Airmen, in the section on NAVAIDS, Communications Outlets, and Service.

(2) "CAT" (Category) INDICATES THE OPERATION BEING CONDUCTED OR APPROVED

Component	Situation	CAT	Effect	Action Requirement
FFM Remote Monitoring Indicator	Status indications not available or abnormal (e.g., remoting lines out of service, FFM bypassed); NOTE: These indications typically have time delays of 15-120 seconds.	All	If ILS critical areas are known to be clear, continue operations. Should weather improve to CAT I for at least four hours and subsequently deteriorate to CAT II/III conditions, FFM sensor(s) must be restored prior to resuming CAT II/III operations. (NOTE: FFM installation not required for CAT I operations; if installed, however, use the preceding text.)	Cat I -- Corrective maintenance Cat II & III -- Expedite corrective maintenance
LOC or GS Executive (Integrity) Monitors (excludes FFM function)	One monitor in a dual-channel system fails, reducing system integrity level.	I	No effect (dual monitors not required)	Corrective maintenance
		II	No effect if fails during CAT II operations. Should weather improve to CAT I for at least four hours and subsequently deteriorate to CAT II conditions, failed monitor must be restored prior to resuming operations.	Expedite corrective maintenance
		III	Denies operations	Initiate NOTAM action and expedite corrective maintenance
Outer Marker Beacon (OM); Compass Locator (COMLO); Distance Measuring Equipment (DME)	Inoperative	All	If the final approach fix (FAF) can be identified by one or more of these facilities and/or another NAVAID (e.g., radar), or published waypoint, there is no effect. If the FAF cannot be identified (e.g., no method available for timing of descent), non-precision operations cannot be conducted.	Notify aircraft; initiate NOTAM action and corrective maintenance
Middle Marker Beacon (MM)	Inoperative	All	No effect	Notify aircraft; initiate NOTAM action and corrective maintenance

Component	Situation	CAT	Effect	Action Requirement
Inner Marker Beacon (IM)	Inoperative	I	No effect	Notify aircraft; initiate NOTAM action
		II	Limits lowest visibility to RVR 1600 unless aircraft equipped with radio altimeter and Standard Instrument Approach Procedure (SIAP) does not prohibit its use.	Notify aircraft; initiate NOTAM action
		III	No effect	Notify aircraft; initiate NOTAM action
Touchdown RVR	Inoperative (Some operators using aircraft equipped with fail-operational rollout control systems are authorized to continue operations with any one transmissometer temporarily inoperative)	I	Increases CAT I minima to 1/2 mile	Notify aircraft of the inoperative component, and initiate NOTAM action.
		II &III	Denies operations	Notify aircraft of the inoperative component, and initiate NOTAM action. Expedite corrective maintenance.
Midpoint RVR	Inoperative (Some operators using aircraft equipped with fail-operational rollout control systems are authorized to continue operations with any one transmissometer temporarily inoperative)	I	No effect	Notify aircraft of the inoperative component, and initiate NOTAM action.
		II	Increase CATII minima to RVR 1600 unless rollout RVR is operative -- i.e., rollout can be used as a substitute.	Notify aircraft of the inoperative component, and initiate NOTAM action. Expedite corrective maintenance.
		III	Denies operations	Notify aircraft of the inoperative component, and initiate NOTAM action. Expedite corrective maintenance.
Rollout RVR	Inoperative (Some operators using aircraft equipped with fail-operational rollout control systems are authorized to continue operations with any one transmissometer temporarily inoperative)	I	No effect	Notify aircraft of the inoperative component, and initiate NOTAM action.
		II	Required for minima below RVR 1600 unless midpoint RVR is operative -- i.e., midpoint can be used as a substitute.	Notify aircraft of the inoperative component, and initiate NOTAM action. Expedite corrective maintenance.
		III	Denies operations	Notify aircraft of the inoperative component, and initiate NOTAM action. Expedite corrective maintenance.

Component	Situation	CAT	Effect	Action Requirement
Approach Lighting System (Excluding SFL/RAIL)	Inoperative	I	Increases visibility to 3/4 mile or RVR 4000	Notify aircraft of the inoperative component, and initiate NOTAM action.
		II & III	Denies operations	Notify aircraft of the inoperative component, and initiate NOTAM identifying inoperative component. Expedite corrective maintenance.
Approach Lighting System	ALSF being operated as SALSR	I	No effect	Notify aircraft ALSF is inoperative as above. Issue NOTAM indicating ALSF RWYXX Inop. SALSR Approach Lighting System is available UFN (date). With notation that CATII operators verify CATII with SALSR authorization.
		II & III	CATII and all CATIII operations are permitted, provided the ALS can continue to operate as a SALS.	
Power Source for Approach Lighting System (Excluding SFL/RAIL)	Main or standby (commercial) power source inoperative	I	No effect	None
		II & III	Denies operations unless lights can be visually or are remotely monitored continuously, and aircraft can be informed immediately if a failure occurs.	Initiate NOTAM action and expedite corrective maintenance.
Sequence Flashing Lights (SFL/RAIL)	Inoperative	I	RAIL: Increases visibility to 3/4 mile or RVR 4000 SFL: No effect	Notify aircraft of the inoperative component, and initiate NOTAM action.
		II	Denies operations	Notify aircraft of the inoperative component, and initiate NOTAM action. Expedite corrective maintenance.
		III	No effect	Expedite corrective maintenance.
Standby Power Source for SFL/RAIL	Inoperative	I	No effect	None
		II	Denies operations unless lights can be visually or are remotely monitored continuously, and aircraft can be informed immediately if a failure occurs.	Initiate NOTAM action and expedite corrective maintenance.
		III	No effect	Initiate NOTAM action and expedite corrective maintenance.

Component	Situation	CAT	Effect	Action Requirement
Standby Power Source for TDZL and/or RCLS Lights	Inoperative	I	No effect	None
		II	Denies operations unless lights can be visually or are remotely monitored continuously, and aircraft can be informed immediately if a failure occurs.	Initiate NOTAM action and expedite corrective maintenance.
		III	Denies operations	Initiate NOTAM action and expedite corrective maintenance.
Runway Edge Lights	More than 10% of the runway edge lights are not functioning	I	Day: Minima below RVR 2,400 not authorized. Night: Denies TITLE 14 CFR Part 97 straight-in landing minima	Notify aircraft of the inoperative component, and initiate NOTAM action.
		II & III	Denies operations	Notify aircraft of the inoperative component, and initiate NOTAM action. Expedite corrective maintenance.
Standby Power Source for Runway Edge Lights	Inoperative	I	No effect	None
		II & III	Denies operations unless lights can be visually or are remotely monitored continuously, and aircraft can be informed immediately if a failure occurs.	Notify aircraft of the inoperative component, and initiate NOTAM action. Expedite corrective maintenance.
Taxiway Centerline Lights	Visibility is less than RVR 600, and more than 10% of the lights on the active taxiway(s) are not functioning	I & II	Not Applicable	None
		III	Denies operations below RVR 600 unless alternate procedures have been approved by Air Traffic and Flight Standards.	Notify aircraft of the inoperative component, and initiate NOTAM action. Expedite corrective maintenance.

APPENDIX D. Common Vehicle Call signs

AIRPORT	Airport Management
ENGINEER	Airport Engineer
MAINTENANCE	Mowing Equipment
MOWER	Mowing Equipment (Big Mower/Small Mower)
ELECTRIC	Airport Electrician
SERVICE	Airport Field Office
UNIT	Emergency Equipment
CONTRACT	Special Contract Vehicle
FAA	FAA
GOVERNMENT	FAA
OPS	Airport Operations (OPS 100 is always the field officer)
GUARD	Air National Guard
TULSA SOFF	Air National Guard Supervisor of Flying
HYDRAZINE 1	Air National Guard hydrazine hazmat
FODBOSS 1	Air National Guard FOD removal

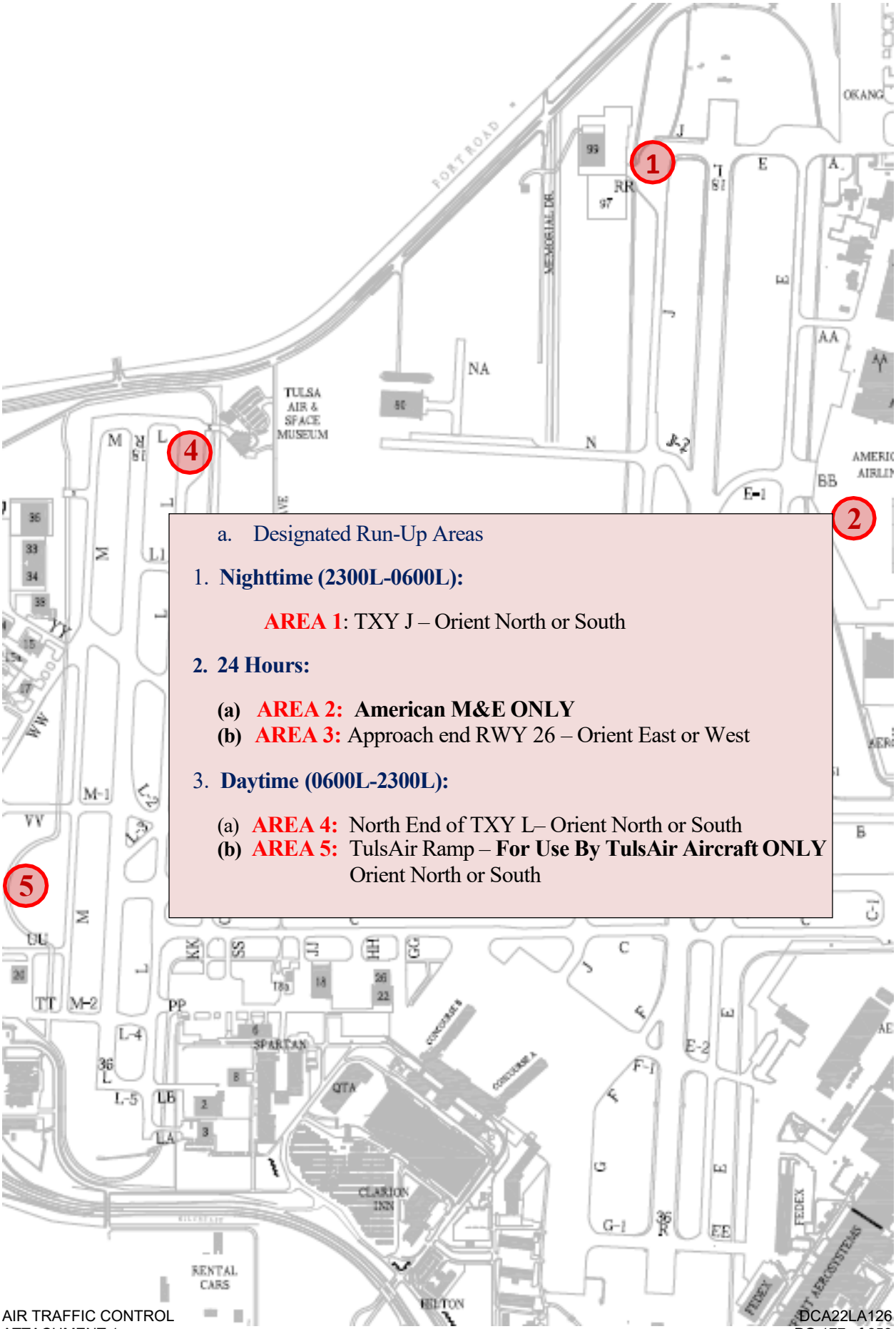
APPENDIX E. Runway and Taxiway Weight Restrictions

RUNWAY WEIGHT RESTRICTIONS			
Runway	Single	Dual	Dual Tandem
18L/36R	75,000	200,000	400,000
8/26	75,000	200,000	360,000
18R/36L	60,000	100,000	

TAXIWAY WEIGHT RESTRICTIONS			
Taxiway	Single	Dual	Dual Tandem
J	75,000	200,000	400,000
J-1	75,000	200,000	400,000
J-2	75,000	200,000	400,000
J-3	75,000	200,000	400,000
E-1	75,000	200,000	400,000
H	75,000	200,000	400,000
F	75,000	200,000	400,000
G	75,000	200,000	400,000
G-1	75,000	200,000	400,000
K (btwn NN & RWY 8/26)	75,000	200,000	400,000
E	75,000	200,000	400,000
B	75,000	200,000	400,000
F-1	75,000	200,000	400,000
C	75,000	200,000	350,000
C-1	75,000	200,000	350,000
C-2	75,000	200,000	350,000
K (btwn TWY m & TWY NN)	60,000	100,000	
L	60,000	100,000	
L-1	60,000	100,000	
L-2	60,000	100,000	
L-3	60,000	100,000	
M	60,000	100,000	
M-1	60,000	100,000	
L-5	60,000	75,000	
L (North of RWY 8/26)	55.000	60,000	
L-4	45,000	60,000	
L (South of TWY C)	37,000	48,000	
M-2	35,000	52,000	

NOTE - West side tenants have been issued waivers by TAIT to exceed taxiway weight restrictions as needed.

APPENDIX F. Special Use Areas



a. Designated Run-Up Areas

1. **Nighttime (2300L-0600L):**

AREA 1: TXY J – Orient North or South

2. **24 Hours:**

(a) AREA 2: American M&E ONLY
(b) AREA 3: Approach end RWY 26 – Orient East or West

3. **Daytime (0600L-2300L):**

(a) **AREA 4:** North End of TXY L– Orient North or South
(b) AREA 5: TulsAir Ramp – **For Use By TulsAir Aircraft ONLY**
Orient North or South

b. The following areas are depicted below:

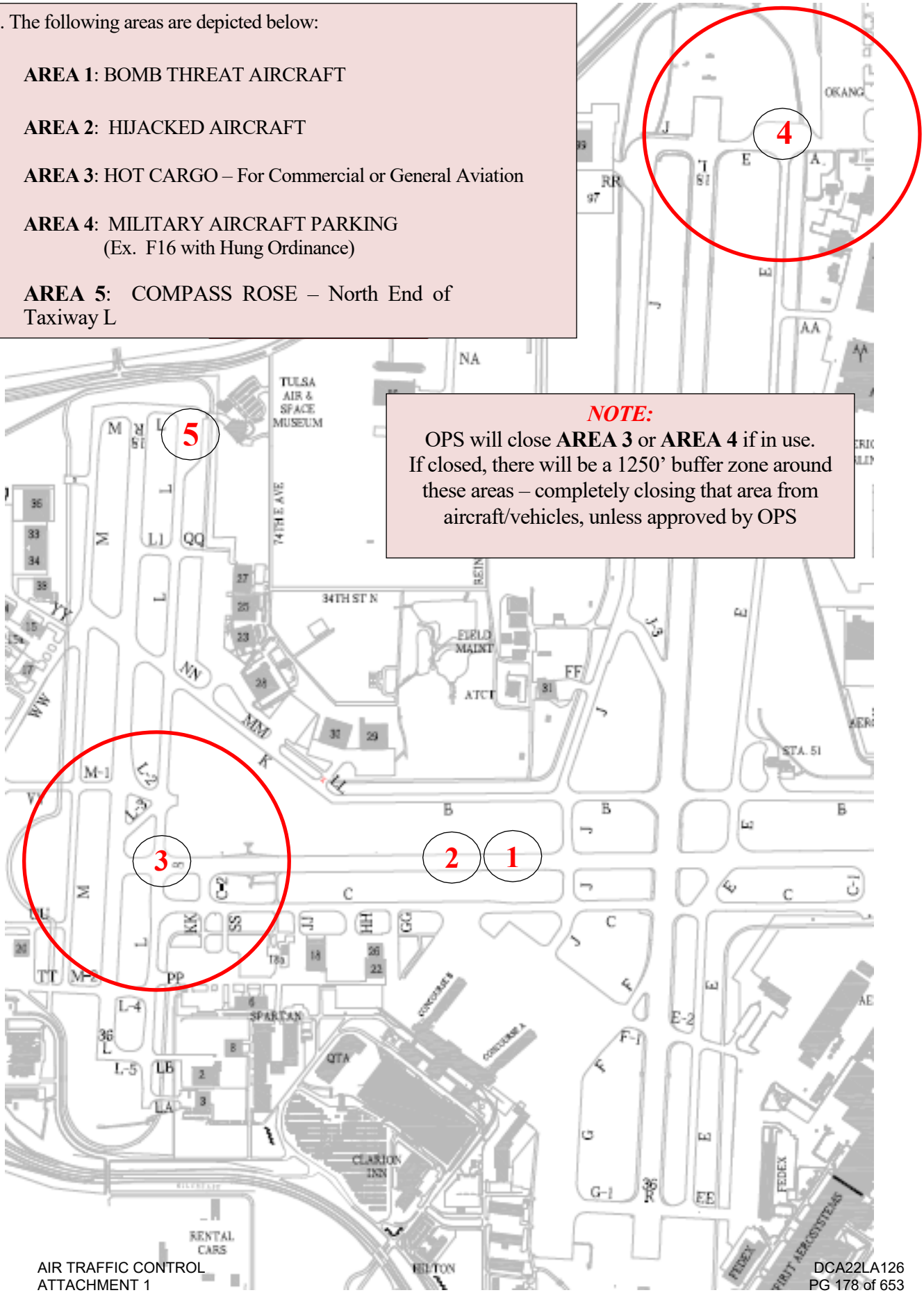
AREA 1: BOMB THREAT AIRCRAFT

AREA 2: HIJACKED AIRCRAFT

AREA 3: HOT CARGO – For Commercial or General Aviation

AREA 4: MILITARY AIRCRAFT PARKING
(Ex. F16 with Hung Ordinance)

AREA 5: COMPASS ROSE – North End of Taxiway L

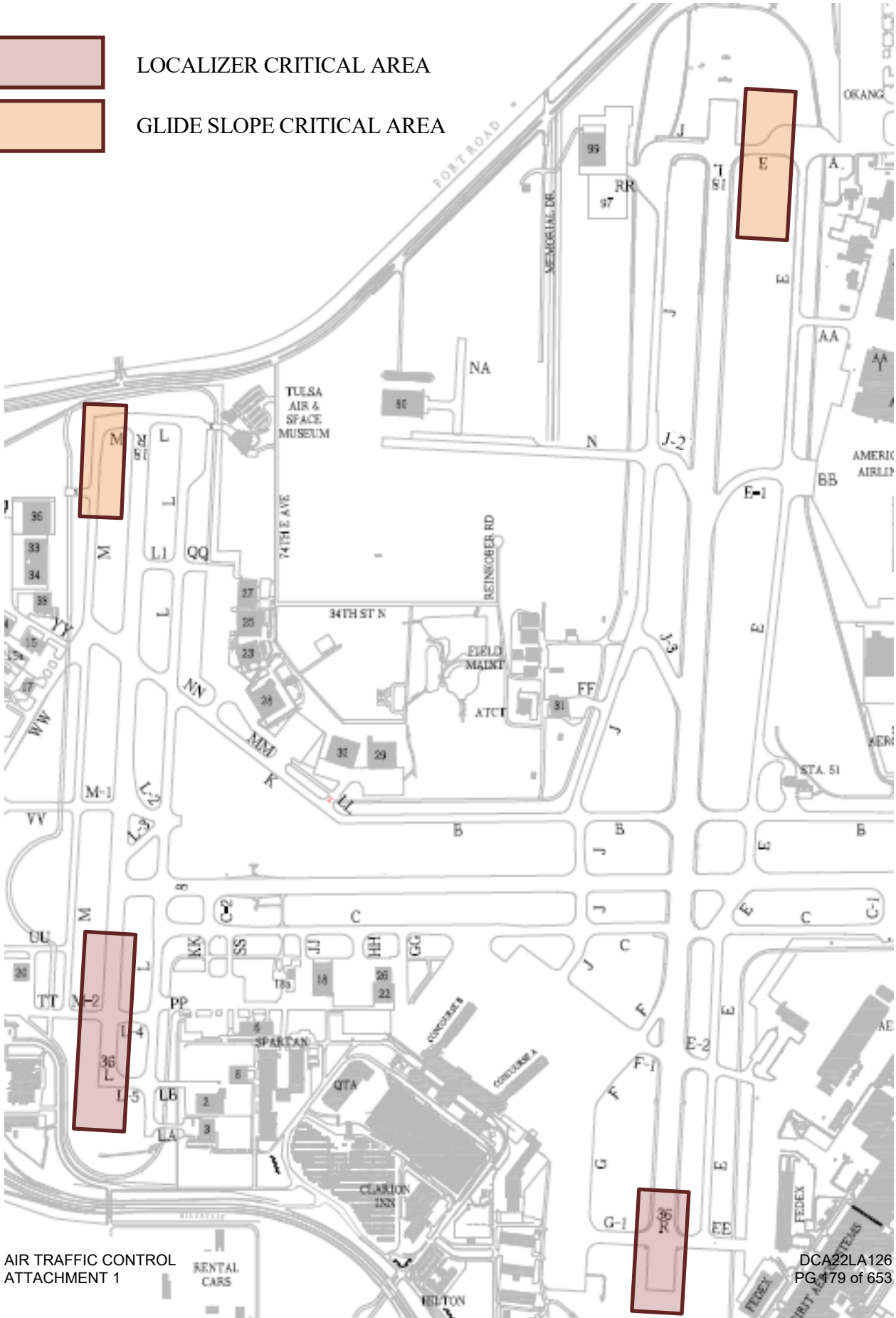


NOTE:
OPS will close **AREA 3** or **AREA 4** if in use. If closed, there will be a 1250' buffer zone around these areas – completely closing that area from aircraft/vehicles, unless approved by OPS

RUNWAY 18R & 18L
CRITICAL AREAS

LOCALIZER CRITICAL AREA

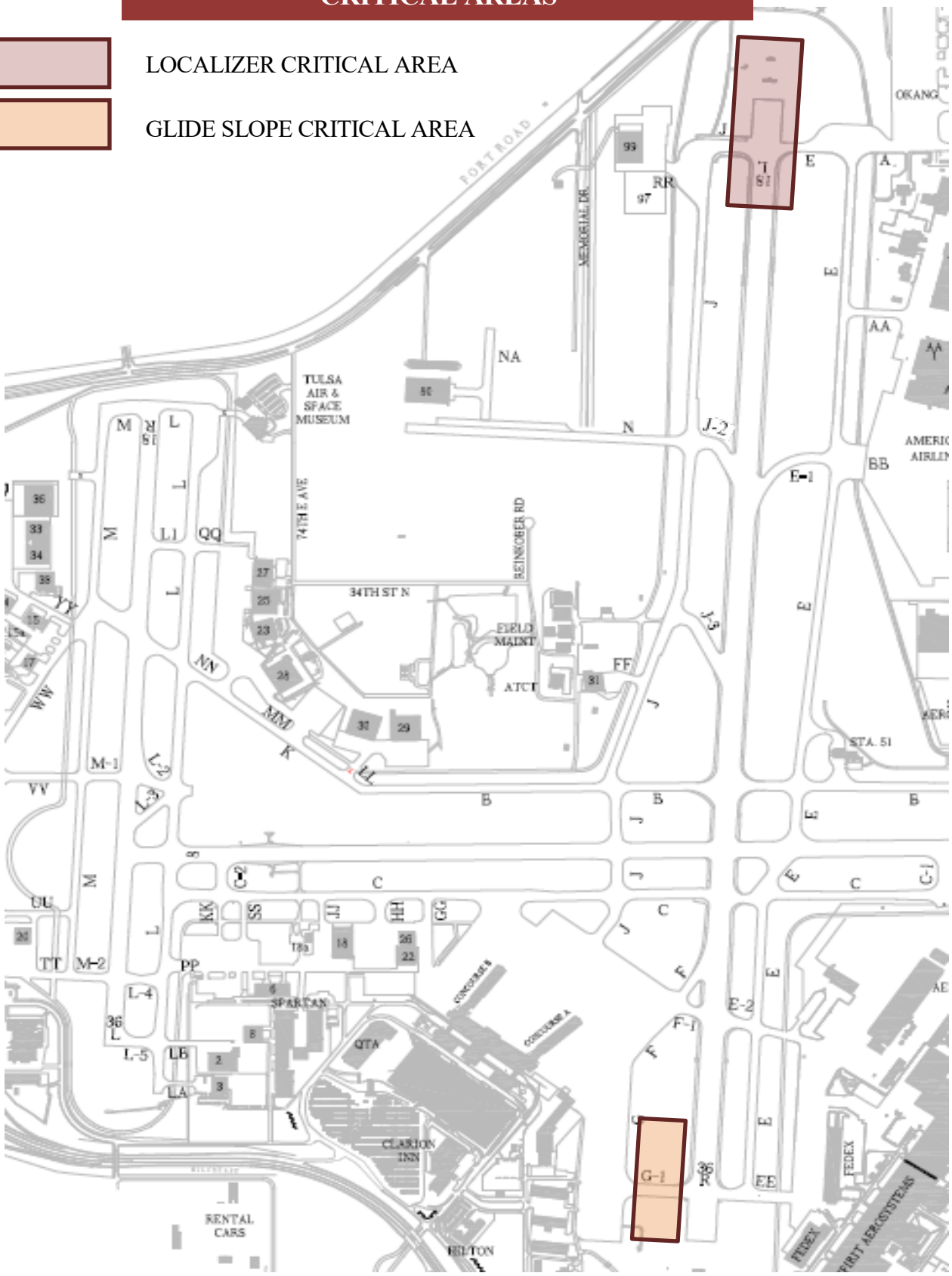
GLIDE SLOPE CRITICAL AREA



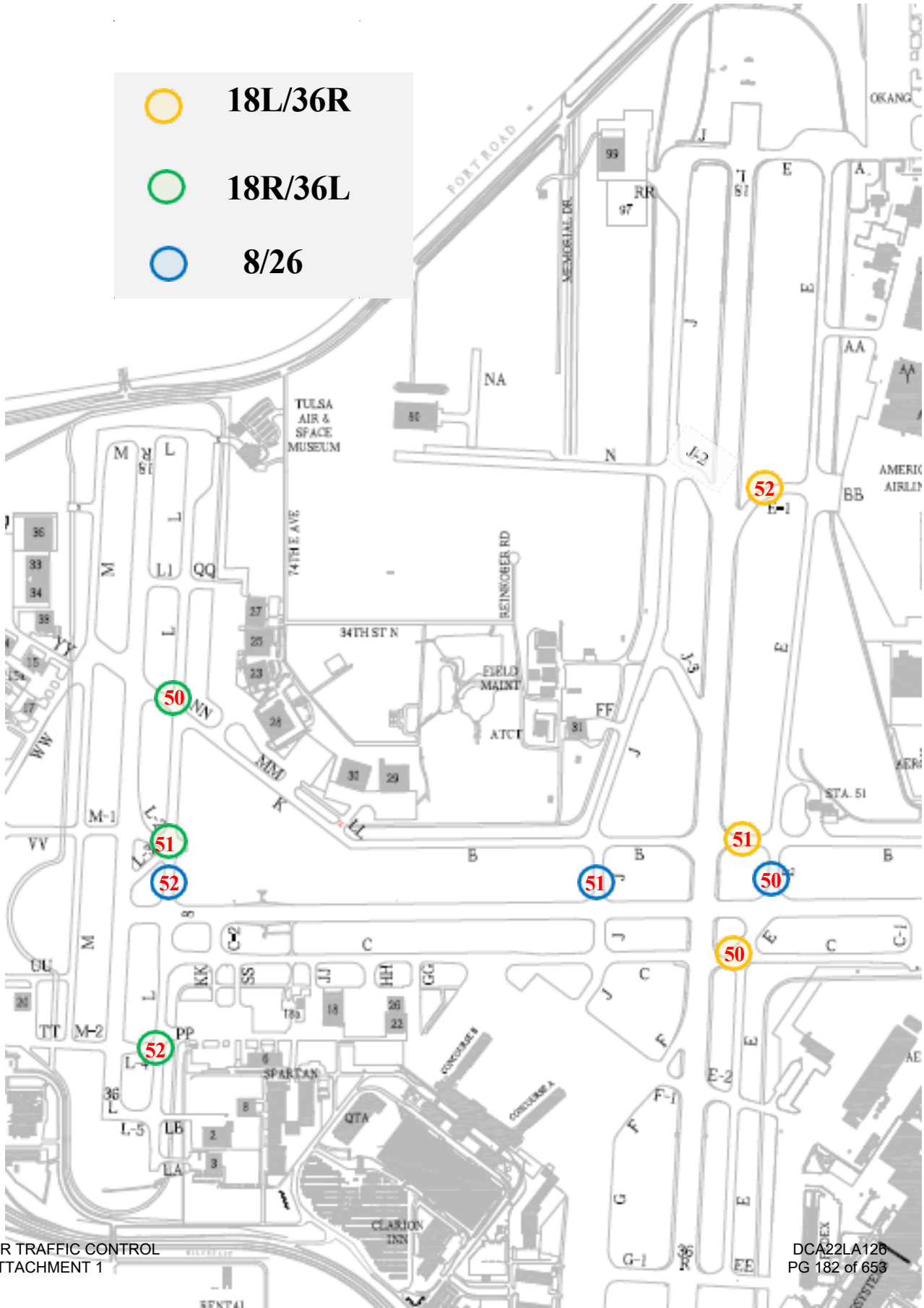
RUNWAY 36R
CRITICAL AREAS

LOCALIZER CRITICAL AREA

GLIDE SLOPE CRITICAL AREA

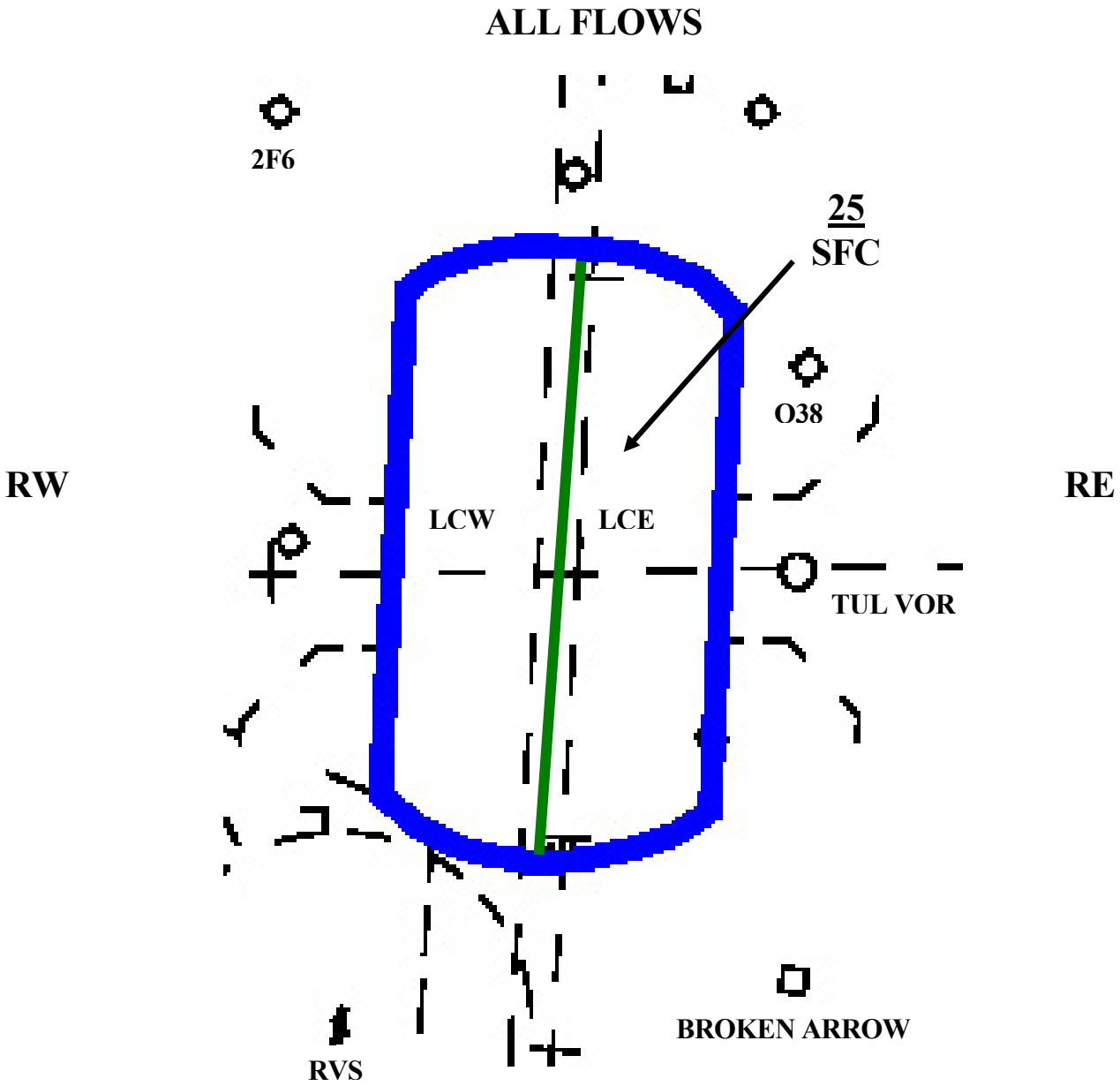


APPENDIX G. Emergency Standby Positions



APPENDIX H. Airspace

a. Tower airspace. LCE/LCW jurisdictional boundary:

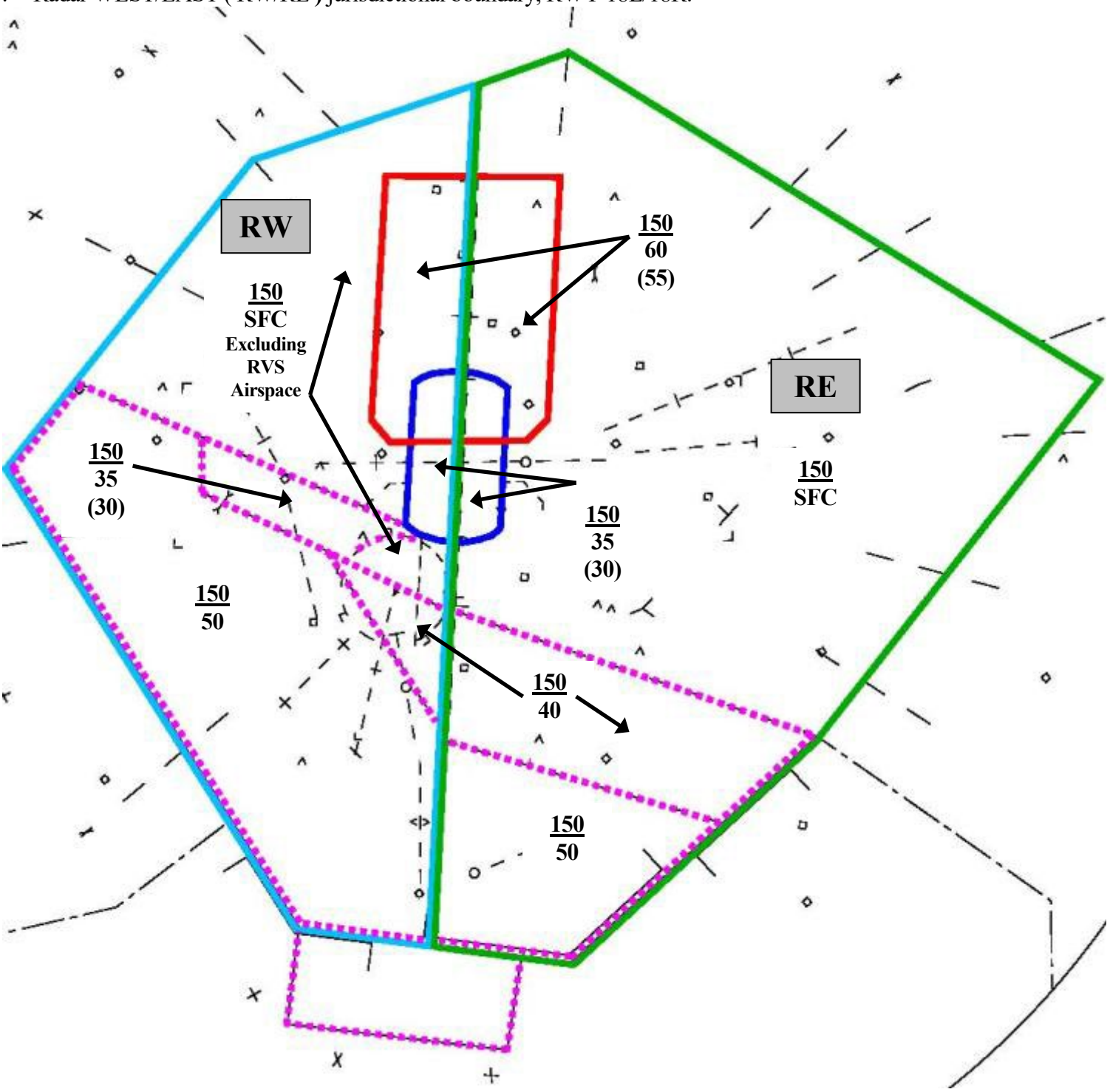


Tower airspace is from the surface up to and including 2,500'.

Tower airspace lateral boundaries are a line 3NM east of and parallel to RWY 18L/36R final approach course and a line 3NM west of and parallel to RWY 18L/36R final approach course. These two parallel lines are joined at the north, by an arc which passes through OWASO, and at the south, by an arc which passes through OILLR.

LCW owns the airspace west of a north/south line between the parallel runways and LCE owns the airspace east of that same line.

b. Radar WEST/EAST (RW/RE) jurisdictional boundary, RWY 18L/18R.

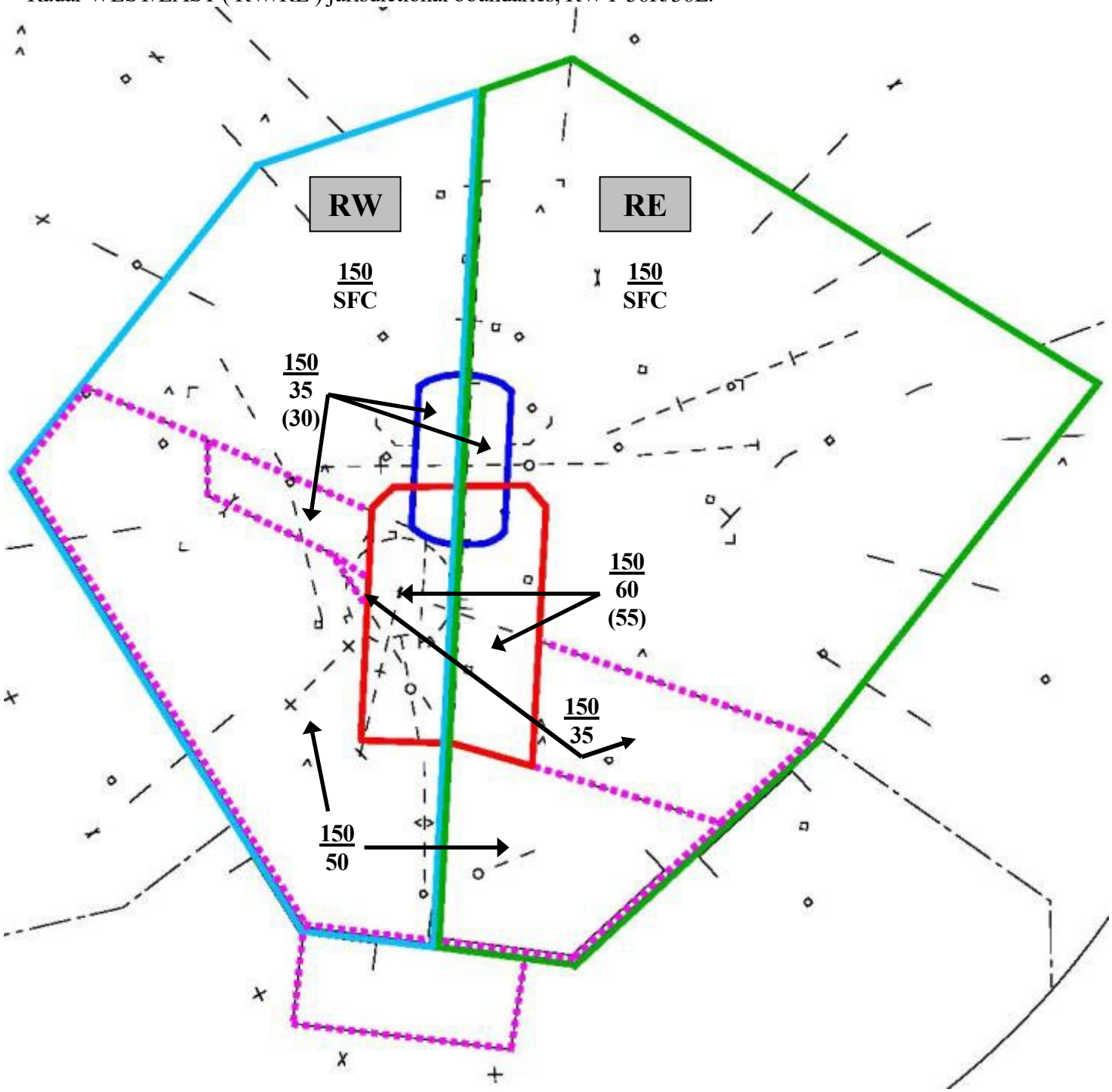


- LEGEND –

RW RE FINALS TOWER RSW/RSE

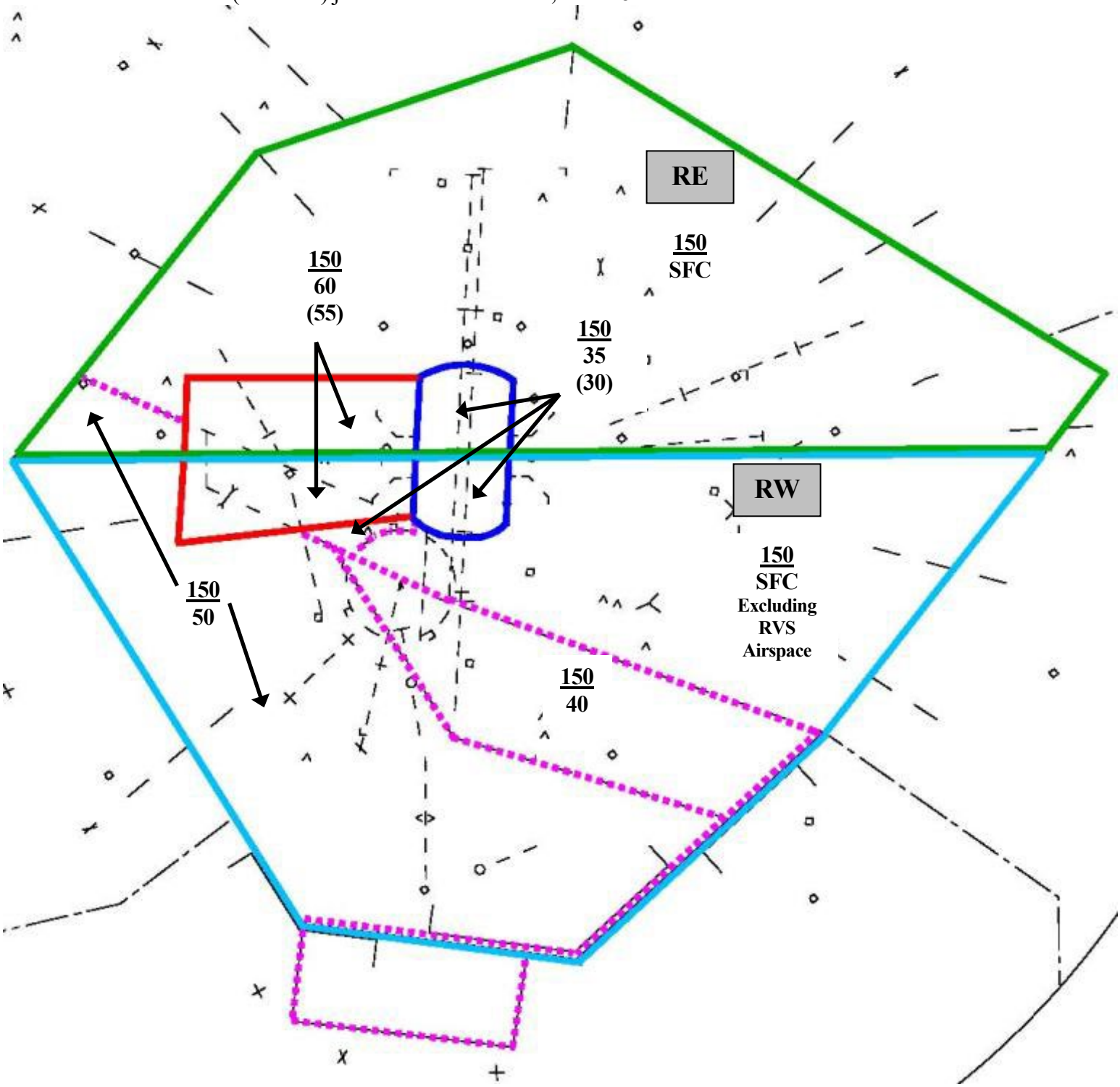
NOTE: RW/RE also own 500' below the indicated IFR floors for VFR aircraft, where depicted in parentheses.

c. Radar WEST/EAST (RW/RE) jurisdictional boundaries, RWY 36R/36L.



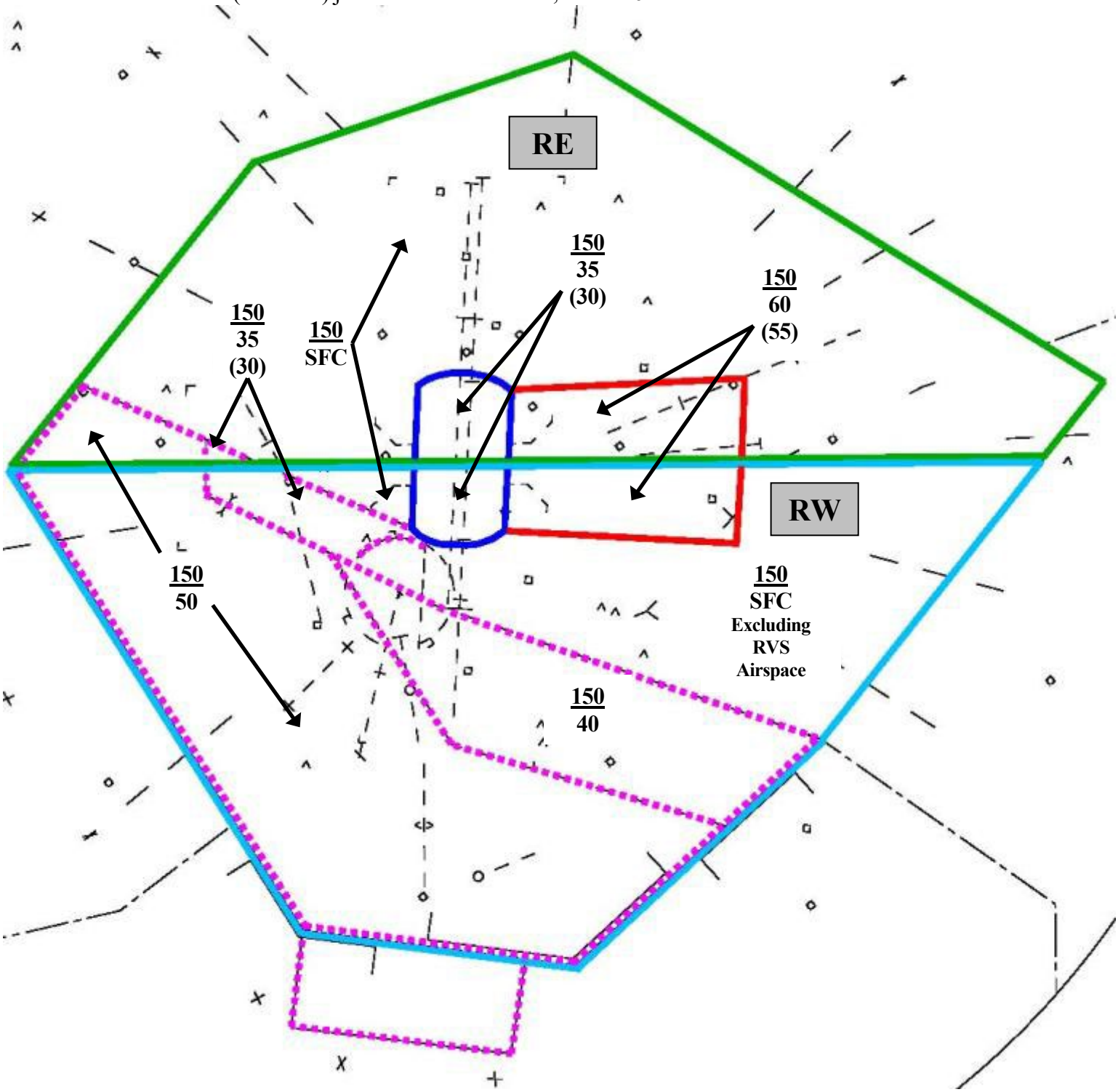
NOTE: RW/RE also own 500' below the indicated IFR floors for VFR aircraft, where depicted in parentheses.

d. Radar WEST/EAST (RW/RE) jurisdictional boundaries, RWY 8.



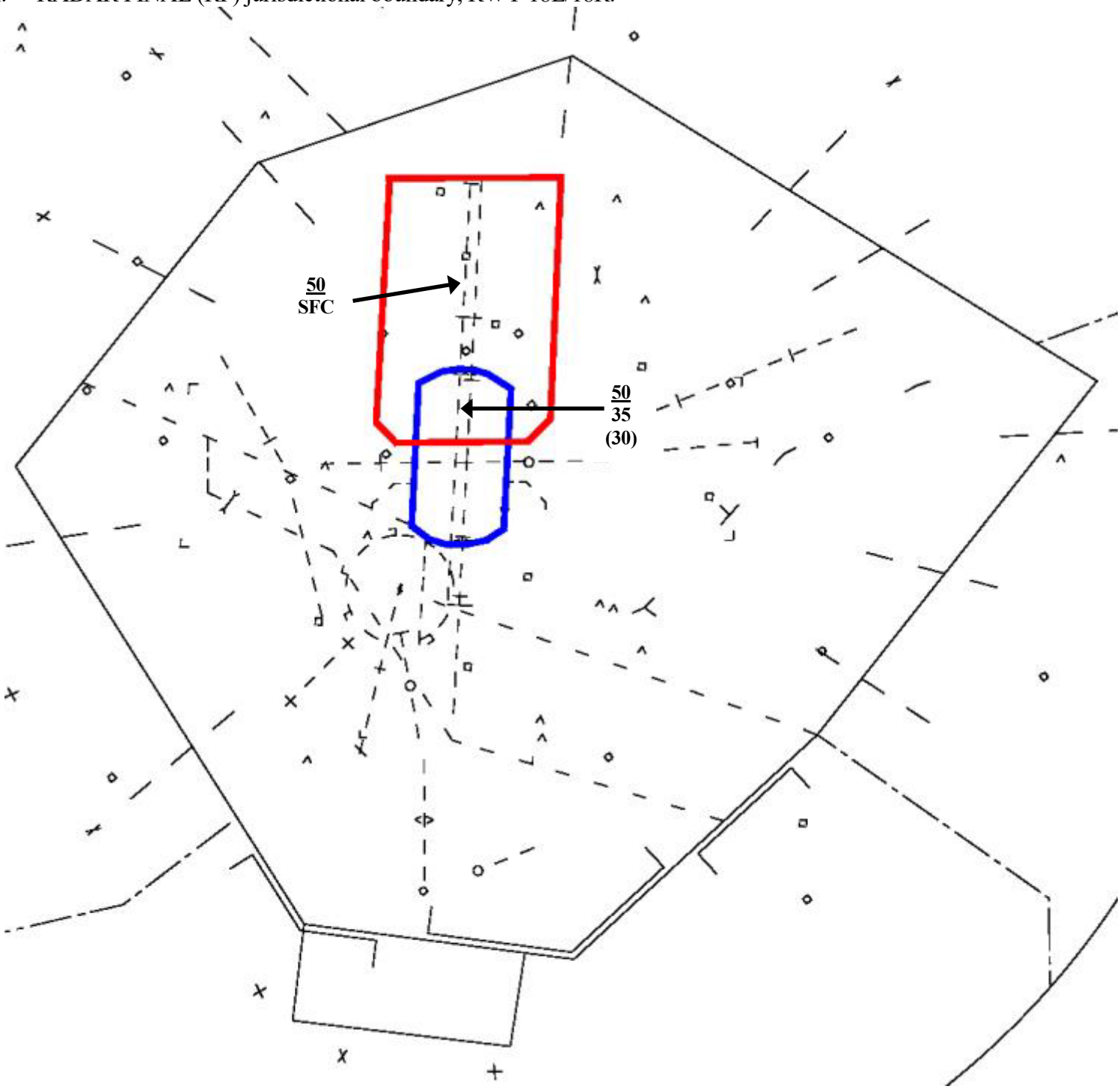
NOTE: RW/RE also own 500' below the indicated IFR floors for VFR aircraft, where depicted in parentheses.

e. Radar WEST/EAST (RW/RE) jurisdictional boundaries, RWY 26.



NOTE: RW/RE also own 500' below the indicated IFR floors for VFR aircraft, where depicted in parentheses.

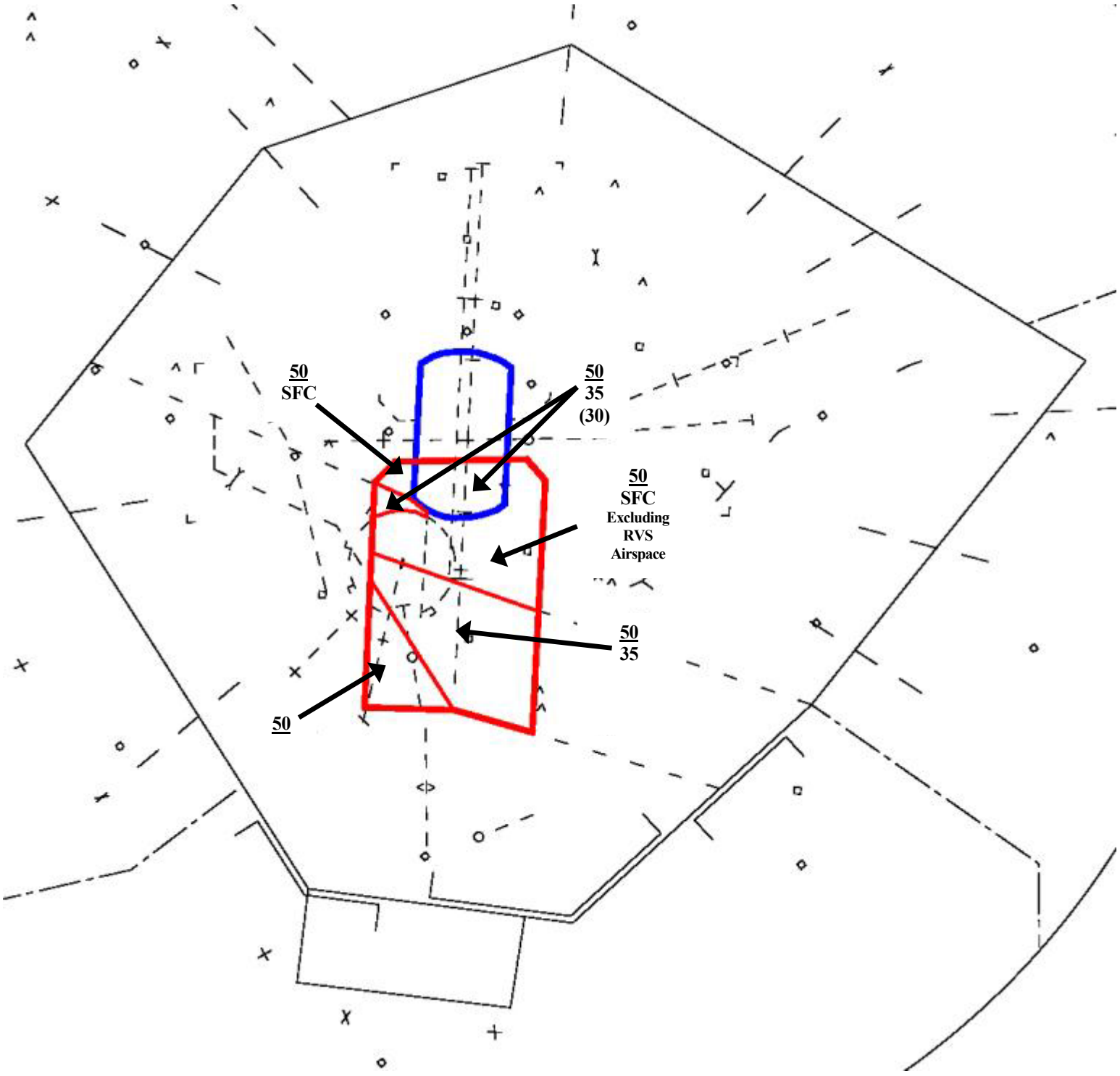
f. RADAR FINAL (RF) jurisdictional boundary, RWY 18L/18R.



FINAL AIRSPACE **TOWER AIRSPACE**

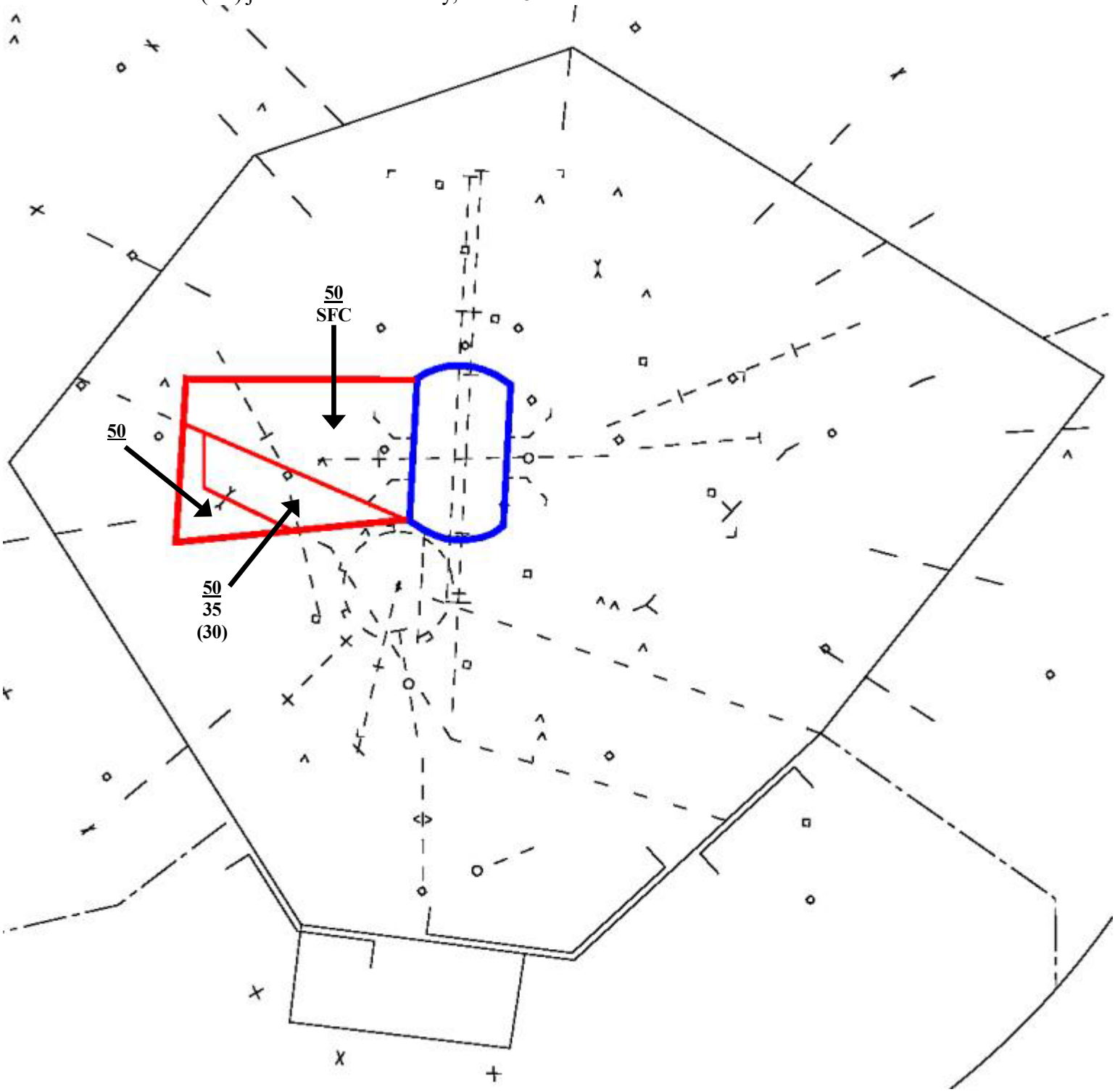
NOTE: RF also owns 500' below the indicated IFR floor for VFR aircraft, where depicted in parentheses.

g. RADAR FINAL (RF) jurisdictional boundary, RWY 36R/36L.



NOTE: RF also owns 500' below the indicated IFR floors for VFR aircraft, where depicted in parentheses.

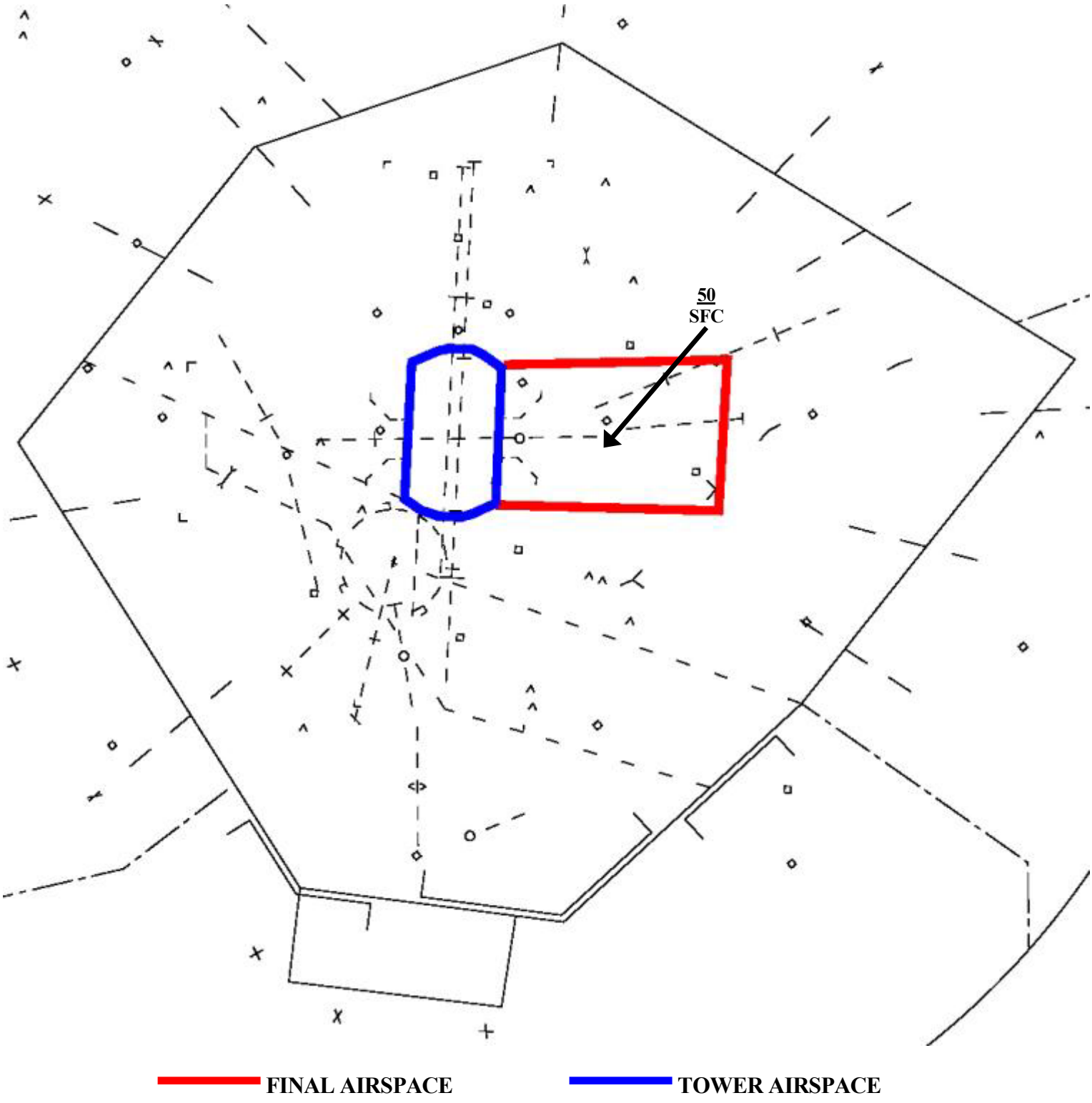
h. RADAR FINAL (RF) jurisdictional boundary, RWY 8.



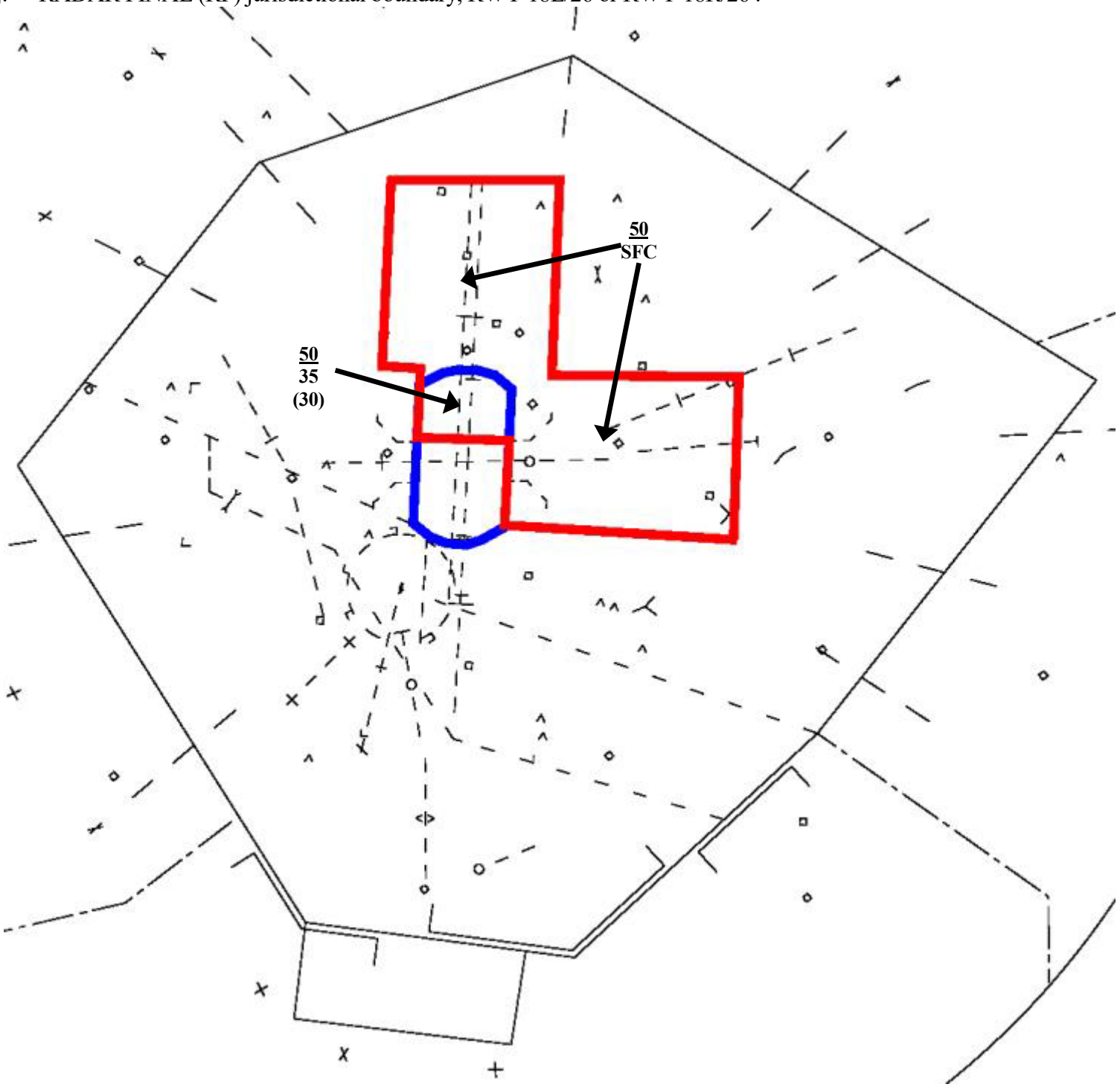
FINAL AIRSPACE **TOWER AIRSPACE**

NOTE: RF also owns 500' below the indicated IFR floor for VFR aircraft, where depicted in parentheses.

i. RADAR FINAL (RF)jurisdictional boundary, RWY 26.



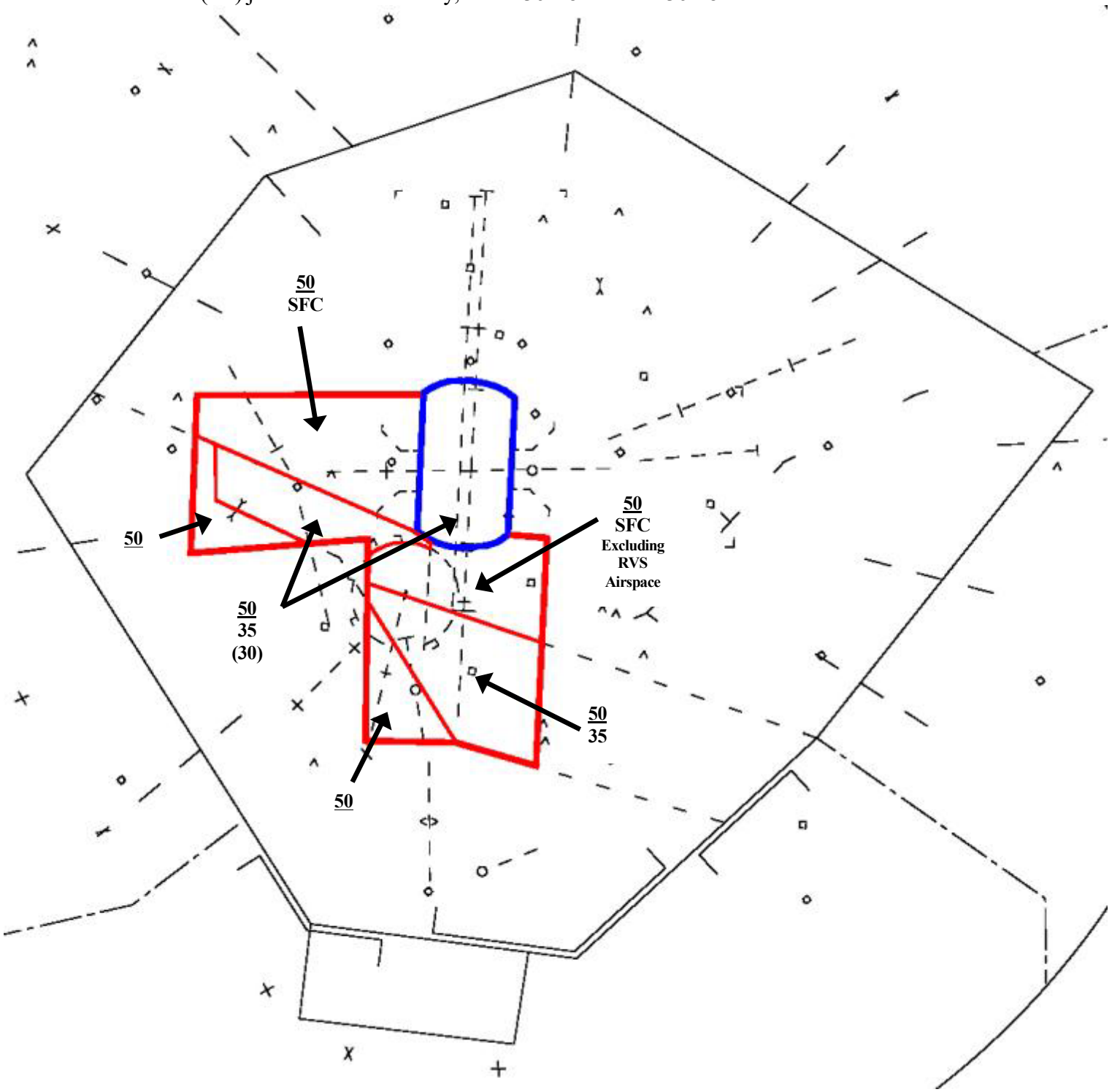
j. RADAR FINAL (RF) jurisdictional boundary, RWY 18L/26 or RWY 18R/26 .



FINAL AIRSPACE **TOWER AIRSPACE**

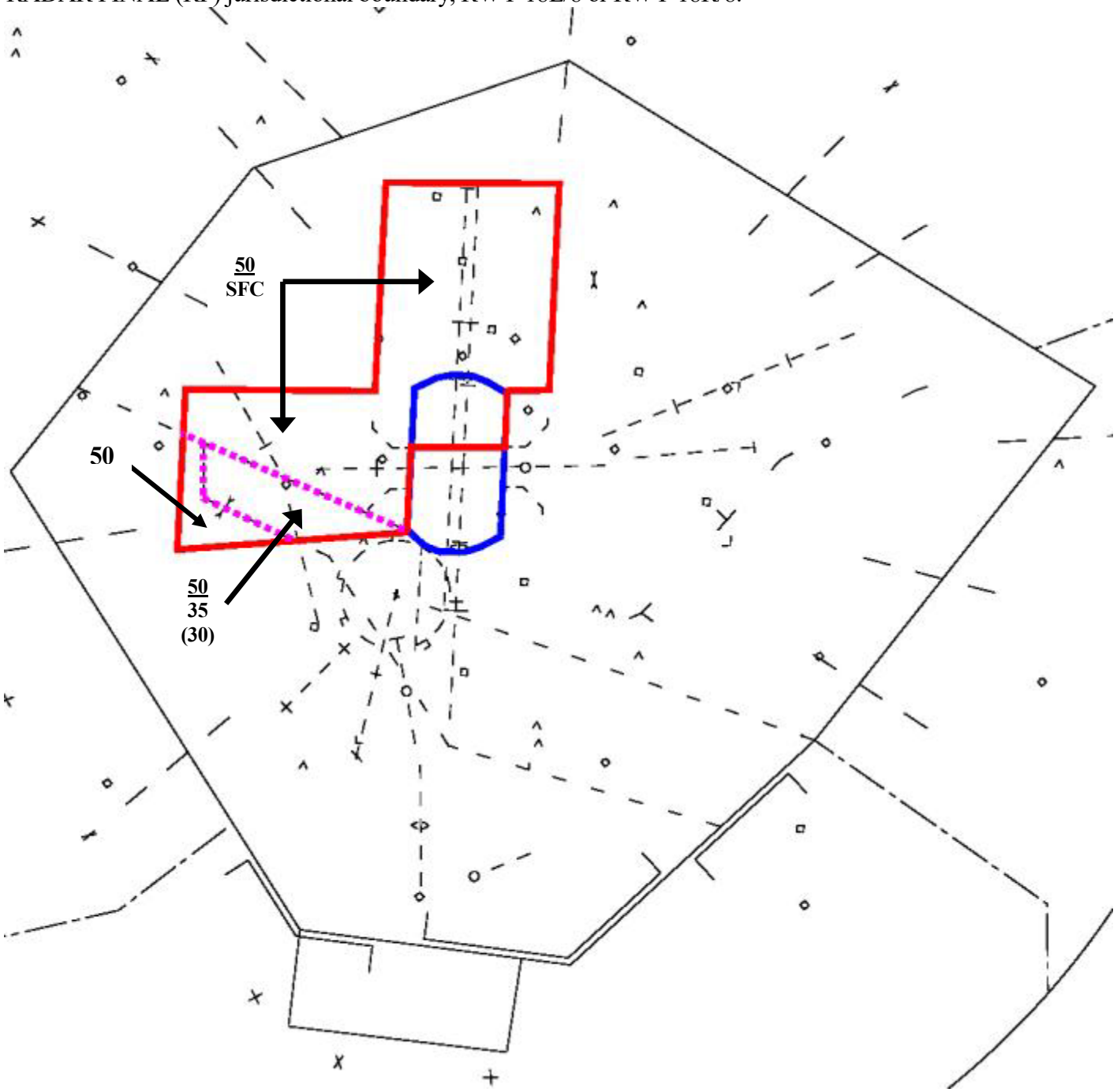
NOTE: RF also owns 500' below the indicated IFR floors for VFR aircraft, where depicted in parenthesis.

k. RADAR FINAL (RF) jurisdictional boundary, RWY 36R/8 or RWY 36L/8.



NOTE: RF also owns 500' below the indicated IFR floor for VFR aircraft, where depicted in parentheses.

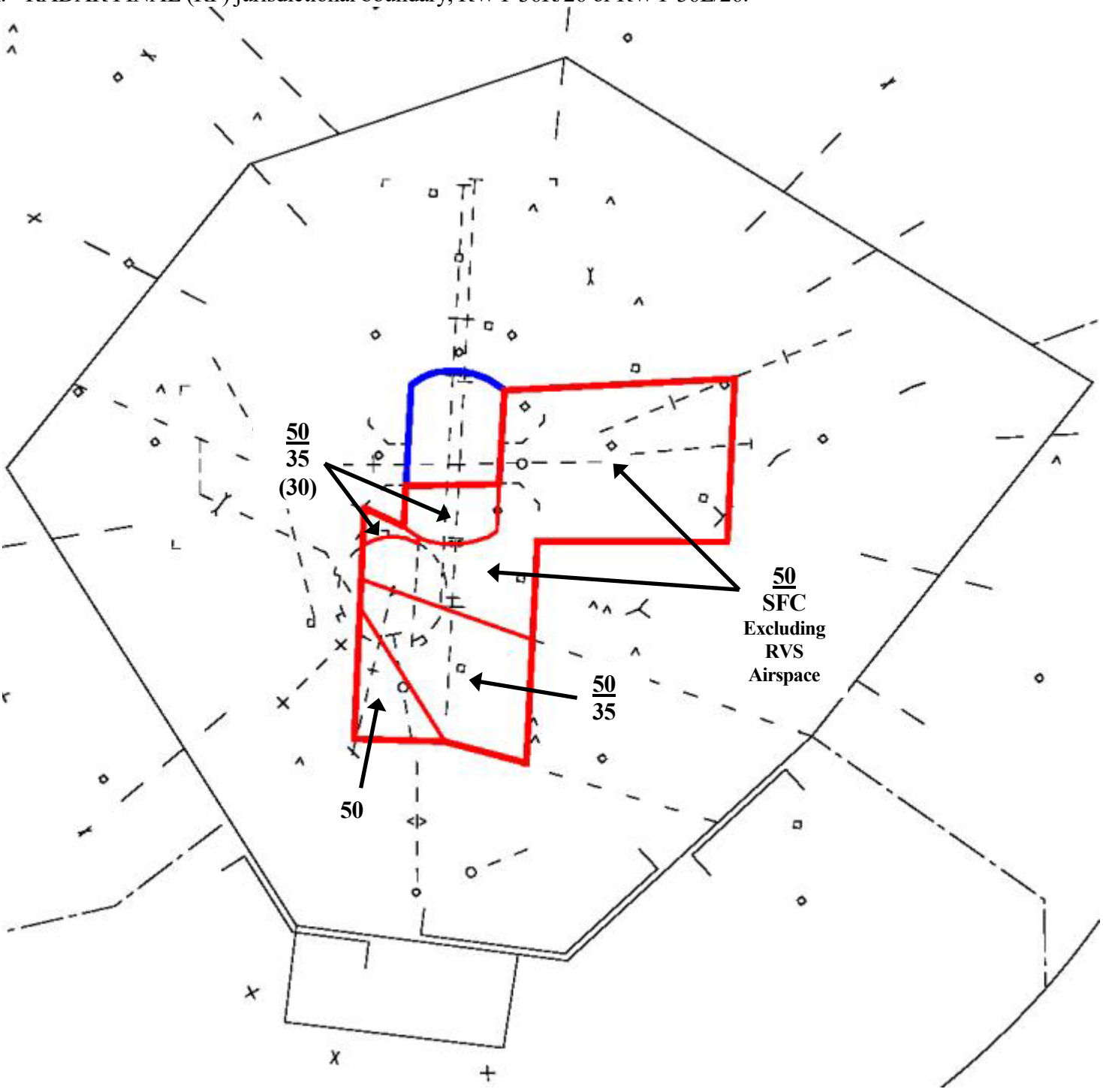
l. RADAR FINAL (RF) jurisdictional boundary, RWY 18L/8 or RWY 18R/8.



FINAL AIRSPACE **TOWER AIRSPACE**

NOTE: RF also owns 500' below the indicated IFR floors for VFR aircraft, where depicted in parenthesis.

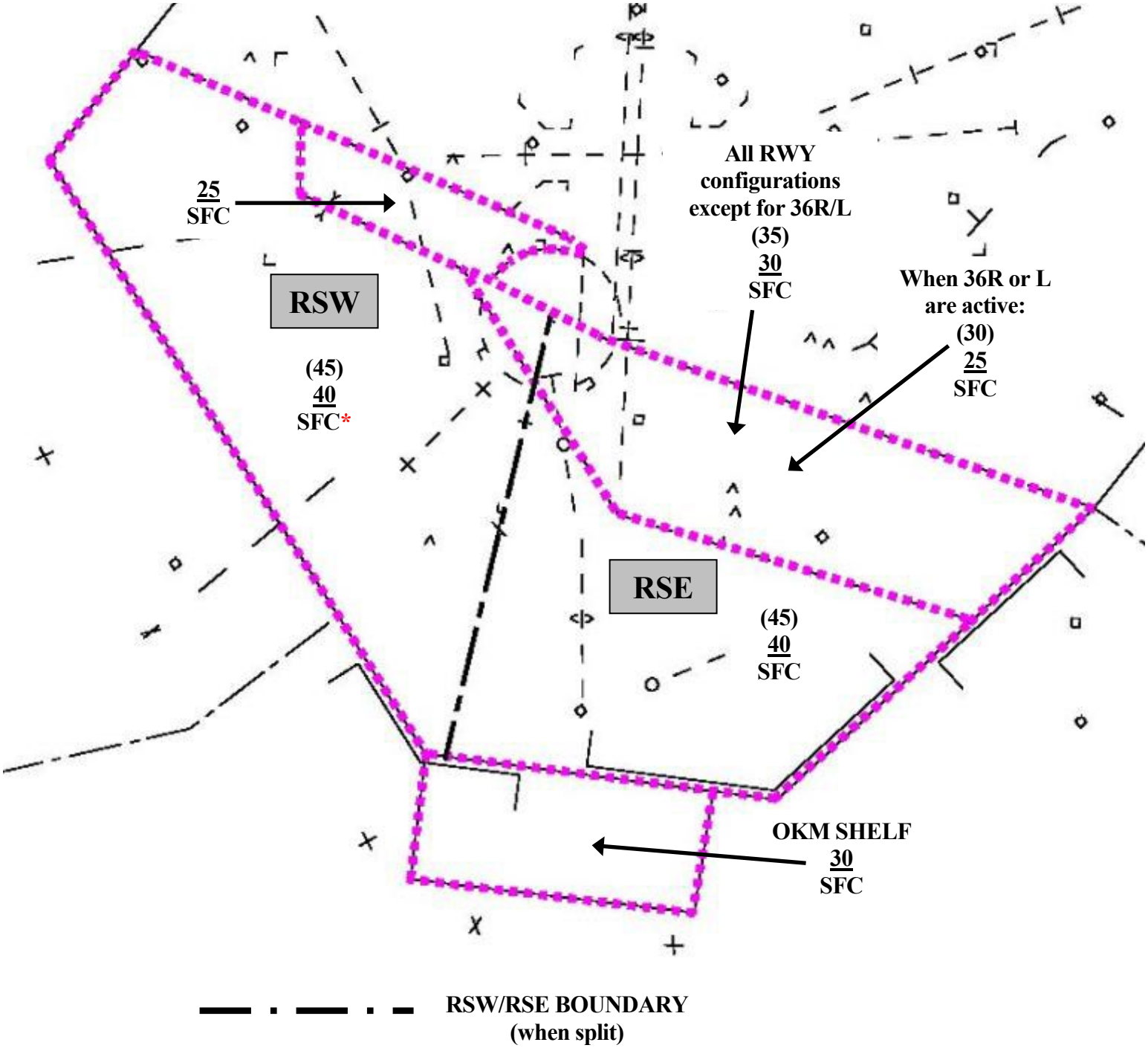
m. RADAR FINAL (RF) jurisdictional boundary, RWY 36R/26 or RWY 36L/26.



FINAL AIRSPACE **TOWER AIRSPACE**

NOTE: RF also owns 500' below the indicated IFR floors for VFR aircraft, where depicted in parenthesis.

n. RADAR SATELLITE WEST/EAST (RSW/RSE) jurisdictional boundaries, ALL FLOWS.



NOTE: RSW/RSE also owns 500' above the indicated IFR ceilings for VFR aircraft, where depicted in parentheses.

APPENDIX I.

RIVERSIDE DESCENT ZONE (RDZ)

Area west of and including the runway 19L/1R extended runway centerline to where it meets the Tulsa Class C surface area SW of TUL, then NW along the class C surface area to where it meets Tower airspace western boundary, then west of tower airspace to the north.

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
TULSA INTERNATIONAL ATCT
3232 N. Memorial Drive
Tulsa, OK 74115

ORDER
TUL ATCT
3120.4N

Effective Date:
4/30/2021

FACILITY TRAINING ORDER

April 30, 2021

Distribution: Facility Binders, Facility Personnel

Initiated By: TUL ATCT

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
TULSA INTERNATIONAL ATCT
3232 N. Memorial Drive
Tulsa, OK 74115

ORDER TUL ATCT 3120.4N
Effective Date:
4/30/2021

SUBJ: Facility Training Order

This order establishes procedures for the administration of the facility On-the-Job Training (OJT), position certification and proficiency training program for Air Traffic Control Specialists at Tulsa International Air Traffic Control Tower/TRACON. The procedures contained in this order are supplemental to those contained in FAA Orders.

[redacted]
Joshua Rogers
Air Traffic Manager
Tulsa International ATCT

Distribution: Facility Binders, Facility Personnel

Initiated By: TUL ATCT

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Chapter 1. General Information

1. Purpose of this Order. This order conveys instructions, standards, and guidance for the administration of air traffic technical training at Tulsa International ATCT.

2. Audience. This order applies to personnel at Tulsa International ATCT.

3. Where Can I Find This Order? https://loa.faa.gov/

4. What this Order Cancels. TUL Order 3120.4M, Facility Training Order.

5. Effective Date. This Order is effective on 4/30/2021.

6. Explanation of Changes. This Order has been revised to comply with new national and local directives.

7. Word Meanings. As used in the order:

a. "Must" means an action is mandatory.

b. "Should" means an action is recommended.

c. "May" means an action is permitted.

d. "Will" is used only to indicate futurity and not a requirement.

e. Singular words include the plural, plural words include the singular.

Chapter 2. Roles and Responsibilities

1. Policy. All qualified personnel are expected to participate in the facility training program. All personnel involved in the training process are responsible for creating, maintaining, and communicating a positive, innovative attitude concerning training. They are also responsible for fostering a positive attitude and firm commitment toward the concept that all Trainees have the potential to succeed in the training program.

2. Air Traffic Manager (ATM). The ATM must ensure the overall efficiency and effectiveness of the facility training program.

3. Support Specialist (SP)/Contract Support Specialist (CS).

a. Ensure that individuals entering qualification training receive a facility orientation and are briefed on the Instructional Program Guide (IPG) for their stage of training, the facility training order, and other pertinent directives, prior to entering training.

b. Provide instructor led portion of classroom training.

c. Conduct lab simulation training using Table-top and AT Coach.

d. Maintain individual Training and Proficiency Records, FAA Form 3120-1/TRAX.

e. Ensure the National Training Database (NTD) is populated.

4. Operations Supervisor (OS).

a. a. The Trainees OS of record must direct training activities of employees under their supervision, promote cooperation and communication, and coordinate resources to assist training**.**

b. Ensure specialists are provided an opportunity to complete recurrent and proficiency training.

5. Principal Facility Representative.

a. Collaborate and meet regularly with the TA. Review training documentation for consistency of training, completeness or corrections of OJT documentation and other training issues to ensure the integrity of the facility training process.

Chapter 3. Facility Technical Training

1. Call For Training. The facility must identify future training requirements for inclusion in the annual call for training.

2. Terminal Basic Radar Training (RTF). The Training Department requests class dates through QMART and coordinates the date/course received with the Trainee's OS.

3. AOV Credentialing. Each facility supervisor/manager is responsible for ensuring their employee's AOV credentials are maintained.

Chapter 4. Training Requirements for Air Traffic Control Specialists

1. Terminal Radar Qualification Exam. Trainee must complete the Terminal Radar Qualification examination and the appropriate portions of Radar Control Training, as part of local control certification. Trainees who have previously passed the Terminal Radar Qualification examination do not need to take the examination again.

2. Proficiency Training. Proficiency training is required for operational personnel to maintain and upgrade the knowledge and skills necessary to apply air traffic procedures in a safe, orderly, and expeditious manner. Proficiency training includes all mandatory briefing items pertaining to qualification, certification, proficiency, or management training distributed by headquarters/regional offices/facilities. The purpose of this requirement is to ensure that the appropriate proficiency training is available to improve knowledge and skill levels and is provided to all employees.

a. Recurrent Training will be conducted in two rounds annually in accordance with JO 3120.4R. Items covered in this training need not be duplicated in local Refresher training.

3. Annual Refresher Training Program. The Annual Refresher Training Program establishes the topics for annual refresher training for TUL Tower/TRACON on a quarterly basis. The Training Department will prepare refresher training according to FAA JO 3120.4 requirements, facility needs and newly identified Special Emphasis Items (SEIs). The Annual Refresher Training Program is separate from National Recurrent Training.

a. 1st Quarter:

(1) Operational Contingency Plan.
(2) ODO Procedures
(a) Coordination, cutoff points, issuing a heading, traffic advisories, phraseology, memory aids, IFR and VFR.

b. 2nd Quarter:

(1) Tower Visibility.
(2) Go-Around's and Missed Approaches.
(3) Airspace Intruder.
(a) Tracked Targets and Untracked Targets.
(b) Airspace Violators – Communications/Non-communications.
(c) Mode C and non-Mode C Equipped Targets.
(d) Defense Event Network (DEN) notification requirements.
(3) Pet 2000 Operation

c. 3rd Quarter:

(1) Local De-icing Procedures.
(2) OS/CIC Refresher Training (1 hour).

(a) Accidents & Incidents.
(b) Unusual Situations.
(c) Upward Reporting.
(d) DEN Notifications and Emergency Events.

d. 4th Quarter:

(1) Radar Simulation Training
(a) Unusual Situations.
(b) IFR/VFR Conflict
(c) Lost Aircraft orientation.
(d) Hijacking.
(e) Aviation Security Procedures.
(f) Seldom Used Procedures.
(g) Primary Radar Back-up Mode.
1 Transitioning to/from normal/backup operations.
2 Radar data processing during backup operations.
3 Control and communication procedures during backup operations.

4. Supplemental Training. This training is administered on an as-needed basis. Examples of Supplemental Training are:

a. Procedures. Changes to Facility Air Traffic Control procedures.

b. Orders. Changes and Notices for local and National Orders.

c. GENOTS. Changes to current operating procedures mandated by GENOTS.

d. Operational Equipment. Changes and additions to operational equipment.

5. Skill Enhancement Training (SET)

a. SET consists of two types of training. Skill Improvement Training (SIT) and Skill Development Training (SDT).

b. SET shall be assigned in accordance with JO 3120.4R Chapter 4 paragraph 5 d. Skill Enhancement Training.

c. CPC: When SET is assigned, the OS must complete TUL Worksheet 3120-5, SET. The OS is responsible for developing the training to be administered. Completed SET must be documented and signed on FAA Form 3120-25, or its electronic equivalent, showing the training was completed. Both the TUL Worksheet 3120-5 and the FAA Form 3120-25 must be forwarded to the Training Department to be documented in Section V of FAA Form 3120-1.

d. Trainee's: When SET is assigned, the OS must complete TUL Worksheet 3120-5, SET. The OS is responsible for developing the training to be administered. Completed SET must be documented and signed on FAA Form 3120-25 or its electronic equivalent showing the training was completed. Both the TUL Worksheet 3120-5, and the FAA Form 3120-25, must be forwarded to the Training Department. SET for Trainee's is not recorded in the employees FAA Form 3120-1.

6. Recertification.

a. All re-certifications must be documented on FAA Form 3120-25 and forwarded to the Training Department for recording in the employees FAA Form 3120-1. Classroom training and OJT hours are determined in FAA JO3120.4.

b. ASR Approaches. Three approaches each calendar quarter must be completed, with at least one being a no-gyro approach. Radar simulation may be used to satisfy these requirements.

Chapter 5. Training and Proficiency Records and Other Reports

1. FAA Form 3120-1. TRAX is used to complete FAA Form 3120-1, Training and Proficiency Records. Records are printed and signed on a quarterly schedule beginning in February. Training folders are maintained in the training office.

2. Training Plan, (TUL Worksheet 3120-1) (Appendix C). Training Plans are developed on TUL Worksheet 3120-1. The same worksheet is used to update Training Plans. Completed worksheets must be forwarded to the Training Department to be recorded and filed.

3. Training Team Meetings. The OS retains training team meeting documentation until the Trainee is certified. If the Trainee does not certify, the Training Review Board may request the information. The training team meeting documentation must be signed by all attendees.

4. FAA Form 3120-25, OJT Instruction/Evaluation Report. FAA Form 3120-25 must be completed in accordance with FAA JO 3120.4 for OJT sessions, Performance Assessment and Certification Skill Checks. Local procedures apply as follows:

a. BLOCK 19, ROUTING. Must be initialed by the Trainee OS to acknowledge review of the report.

b. SPECIAL INSTRUCTIONS. A yellow FAA Form 3120-25 must be used for all performance assessment, certifications, and re-certifications. These may be completed and printed from CEDAR. If yellow paper is not available, a yellow highlighter must be used on the top of the form.

c. ROUTING. Each Trainee will be provided a folder located in the CBI Room to file their training forms. The forms will be collected and forwarded to the Training Department by the 10th of every month.

5. Monthly OJT Progress Reports, (TUL Worksheet 3120-2) (Appendix E). The TUL Worksheet 3120-2, Monthly OJT Progress Report, will be completed by the OS for each Trainee on a monthly basis. This worksheet will be will be forwarded to the Training Department by the 10th of every month.

6. OJTI Evaluation/Certification Form 3120-151 (Appendix F). This worksheet is used by the OS to document the completion of an OJTI Over-the-Shoulder (OTS). Normally, the OTS is completed in June every year on OJTI's currently providing OJT.

7. Skill Enhancement Training, (TUL Worksheet 3120-5) (Appendix G). This worksheet is used by the OS to document the training plan for skill enhancement training for both CPC's and Trainee's.

8. Supplemental OJT Time, **(TUL Worksheet 3120-6 (Appendix H)**. This worksheet is used to document the assignment of additional OJT hours and must be forwarded to the training department when completed.

FAA Form 3120-36, Controller-in-Charge OJT Instruction/Evaluation Report. FAA Form 3120-36 must be completed in accordance with FAA JO 3120.4 for CIC OJT sessions, Performance Assessment and Certification Skill Checks. The OS will forward completed reports to the training department.

Chapter 6. Air Traffic Control Specialist On-the-Job Training and Position Certification

1. Facility Training Hours.

a. Classroom hours may be amended on an individual basis.

b. Established target hours, minimum certification hours and OJF hours must be evaluated annually and, if necessary, adjusted to meet facility needs.

c. Employees entering the Tulsa ATCT training program will be assigned a category based on experience, see Table 6-1. Recency of experience must have occurred within 3 years from the reporting date. Employees that do not meet this time test will fall under the provisions of Category A. Some employees may fall under different categories for Tower training and Radar training depending on their experience. The minimum certification hours must be achieved prior to a Certification Skill Check.

EXPERIENCE	TOWER CATEGORY	RADAR CATEGORY
TOWER ONLY LEVEL 5-6	A	A
TOWER ONLY LEVEL 7-8	B	A
TOWER ONLY LEVEL 9-12	C	A
RADAR ONLY LEVEL 5-6	A	A
RADAR ONLY LEVEL 7-8	A	B
RADAR ONLY LEVEL 9-12	A	C
COMBINED TOWER/RADAR LEVEL 5-6	A	A
COMBINED TOWER/RADAR LEVEL 7-8	B	B
COMBINED TOWER/RADAR LEVEL 9-12	C	C
CENTER ONLY	A	A
NEW HIRES/CTI/MARC	A	A
FORMER TUL CPCs (At ATM's Discretion)	B	C

TBL 6-1

CATEGORY A

Position	Classroom Hours	OJF Hours	Target Hours	Minimum Certification. Hours
Flight Data (FD)	40	0	10	5
Radar Data (RD)	2	0	20	2
Clearance Delivery (CD)	24	2	70	15
Ground Control (GC)	24	2	80	40
Local Control East (LCE)	35	4	190	80
Local Control West (LCW)	5	0	10	1
Radar West (RW)	10	4	160	80
Radar East (RE)	10	0	80	5
Radar Sat. West (RSW)	10	4	110	55
Radar Sat. East (RSE)	10	0	10	1
Radar Final (RF)	10	0	40	20
ASR *				

TBL 6-2

CATEGORY B

Position	Classroom Hours	OJF Hours	Target Hours	Minimum Certification Hours
Flight Data (FD)	24	0	10	2
Radar Data (RD)	1	0	10	2
Clearance Delivery (CD)	16	1	30	8
Ground Control (GC)	16	1	50	25
Local Control East (LCE)	20	2	90	30
Local Control West (LCW)	4	0	10	1
Radar West (RW)	8	2	110	55
Radar East (RE)	8	0	50	1
Radar Sat. West (RSW)	8	1	70	35
Radar Sat. East (RSE)	8	0	10	1
Radar Final (RF)	4	0	30	6
ASR *				

TBL 6-3

CATEGORY C

Position	Classroom Hours	OJF Hours	Target Hours	Minimum Certification Hours
Flight Data (FD)	16	0	10	2
Radar Data (RD)	1	0	10	2
Clearance Delivery (CD)	8	1	20	8
Ground Control (GC)	13	1	40	20
Local Control East (LCE)	13	1	60	30
Local Control West (LCW)	4	0	10	1
Radar West (RW)	4	1	50	25
Radar East (RE)	4	0	30	1
Radar Sat. West (RSW)	4	1	20	10
Radar Sat. East (RSE)	4	0	10	1
Radar Final (RF)	4	0	20	10
ASR *				

TBL 6-4

*NOTE: ASR Position certification is concurrent with certification on RF, provided the employee has completed the required minimum ASR approaches. The required minimum ASR approaches for all Categories are: 15 simulated ASR approaches with 7 being No-Gyro, and 5 live ASR approaches.

2. Training on Combined Positions. The OSIC/CIC must determine which combinations of combined positions must be utilized to meet the needs of the individual in training. The following positions and their associated handoff/coordinator positions are routinely combined at Tulsa:

a. Radar West/Radar East

b. Radar Satellite West/Radar Satellite East

c. Radar West/Radar East/Radar Final

d. Radar West/Radar East/Radar Final/Radar Satellite West/Radar Satellite East

e. Local East/Local West

f. Radar Data/Radar West

3. On-the-Job Familiarization (OJF). OJF should be completed prior to beginning OJT on positions for which OJF is assigned, and must be documented on FAA Form 3120-25. Only the Trainee's signature is required on the FAA Form 3120-25 for OJF.

4. Thirty Day Proficiency Period. For New Hires, CTI, and MARC developments, there must be a thirty day proficiency period after certification on all tower positions and prior to beginning OJT on any TRACON positions. Only the ATM can waive this proficiency period.

5. Selection, Certification, and Evaluation of OJTI's. The selection of OJTI's must be accomplished as follows:

a. OS's will recommend employees for OJTI using the FAA Form 3120-148, OJTI Candidate Abilities and Attributes Report. This form will be forwarded to the TA.

b. The TA organizes a selection panel appointed by the ATM, to review FAA Form 3120-148 and to make their recommendation to the ATM.

c. The ATM makes the selection and forwards the form to the training department for dissemination of results and recording.

d. The Training Department must maintain a list of OJTI's and evaluation due dates. (This may be accomplished using the TRAX computer program)

6. Training Teams. Training teams must meet monthly to evaluate training progress and provide feedback on Trainee's that have received training during that month. All training team meetings must be documented.

7. Supplemental OJT Time. The ATM will utilize TUL Worksheet 3120-6 to assign additional OJT hours. This worksheet must be forwarded to the Training Department to be recorded and filed.

8. OJT Checklist. OJT Checklists have been developed for all phases of training to indicate when the Trainee has successfully demonstrated their ability to perform these duties as a certified professional controller. The checklist will be initialed and dated for each event. When completed, the Trainee, an OJTI from the training team, and the OS will print their name, sign and date the bottom of the form indicating that all items have been demonstrated satisfactorily. When the OJTI's from the training team believe the Trainee is ready for certification, they must sign the checklist in the space provided.

Chapter 7. Flight Deck Training (FDT)

Flight Deck Training (FDT) is voluntary training in which eligible 2152 personnel may participate. This training is intended to familiarize air traffic personnel with the operations within the cockpit so that controllers can utilize that knowledge to improve performance on the job. All FDT must be accomplished in accordance with FAA JO 3120.29 and this order.

1. General.

a. The training department must maintain a roster of FDT course completions (eLMS Course 60004464). This may be accomplished via eLMS reports.

b. The ATM or OS is responsible for notifying the FDT Program Management Office (PMO) any time overtime is used as a direct cause of the FDT participant's inability to return to the duty station, any denial of a FDT flight due to the CASS operation, or any event with an airline, the Transportation Security Administration, Homeland Security, or other FAA departments requiring FDT PMO support or intervention.

c. The ATM or OS is the approving authority for FAA Form 3120-37.

d. The ATM or management designee is the approving authority for FAA Form 3120-38.

2. Process and Responsibilities.

a. The participant is responsible for completing the required eLMS course and reviewing applicable materials within the year preceding an FDT request.

b. The participant "Create a New FDT Request" and submit it via the FDT website (https://atotechtraining.faa.gov/FDTAS/).

c. The participants OS will review and, if warranted, approve all requests before they are forwarded to the facility Person in Charge (POC).

d. The facility POC will also review and, if warranted, approve all requests.

e. The facility POC will print all FDT forms (3120-37 and 3120-38) and give them to, or place them in the mailbox of the participant.

f. The facility POC will issue a 3120-39 to the participant.

NOTE: Any of the approval authorities may disapprove any requests, or require changes to be made and resubmitted.

g. Return all documents that allow access to the flight deck. Any unused tickets (3120-38) and the 3120-39 must be returned to the facility the next duty day.

h. The participant will log into the FDT website and complete an electronic training report (3120-40) and have it signed by their OS no later than 14 days after the scheduled return. Handwritten or typed paper copies will not be accepted.

i. The 3120-40 will be reviewed and approved by the participants OS and the POC before being submitted to the PMO.

Appendix A. TUL Instructional Program Guide (IPG)

This IPG includes information about the following five development stages:

1. Flight Data/Clearance Delivery (FD/CD) Course 55060/55061
2. Ground Control (GC) Course 565062
3. Local Control (LC) and Cab Coordinator (CC) Course 55063
4. Radar Flight Data (RD) Course 55060
5. Non-Radar and Radar Course 55064/55065

Note: General stages 1 and 2 must be completed prior to beginning Stage 3. Stage 3 must be completed prior to beginning stages 4 and 5. However, the TA may determine the appropriate order of completion based upon Trainee experience and facility needs.

STAGE 1. Flight Data/Clearance Delivery (FD/CD)
Course 55060/55061

General: This stage of training is administered in two parts: Instructor-led Training and OJT. The objective of this phase of training is to prepare the Trainee for OJT on the Flight Data and Clearance Delivery positions.

Training Length: Up to 80 hours of instructor-led/self-study training will be allotted. FAA Academy lesson plans are not used for this phase of training.

Instructor-led Training: Each Trainee is required to demonstrate a comprehensive working knowledge of:

a. Local airport information/terminal area.
b. Position associated equipment.
c. FD/CD local procedures.
d. Weather.
e. Position application of LOA's, directives, and appropriate publications and logs.
f. Position relief briefings.

Instructor-led Evaluation: Each specialist must satisfactorily complete the following evaluations with a score of 70% or greater in order to complete the Instructor-led phase:

a. Airways/Jet Routes Evaluation
b. MEA/MOCA Evaluation
c. Airspace Evaluation
d. Video Map Evaluation
e. FD/CD Written Evaluation

Simulation Training: Simulation Training is not available for FD/CD.

OJT: Allotted hours are located in Chapter 6 of this order.

OJT Checklist: The checklist for FD/CD must be completed prior to certification on this position. The checklist is located in Appendix H of this order.

STAGE 2. Ground Control (GC)
Course 55062

General: This stage of training is administered in three parts: Instructor-led Training, Table-top Simulation and OJT. The objective of this phase of training is to prepare the Trainee for OJT on the Ground Control position.

Training Length: Up to 40 hours of instructor-led/self-study training will be allotted. FAA Academy lesson plans are not used for this phase of training. An airport tour will be scheduled during the instructor-led portion of this training.

Instructor-led Training: Each Trainee is required to demonstrate a comprehensive working knowledge of:

a. Airport diagram.
b. Position associated equipment.
c. GC local procedures.
d. Position application of LOA's, directives, and appropriate publications and logs.
e. Position relief briefings.
f. Recovery.

Instructor-led Evaluation: Each specialist must satisfactorily complete the following evaluations with a score of 70% or greater in order to complete the Instructor-led phase:

a. Airport Hangar/Tenant Evaluation
b. Runway/Taxiway Evaluation
c. GC Written Evaluation

Simulation Training: Up to 4 hours of Table-top simulation training will be allotted. Table-top simulation training is not pass/fail. Each Trainee is required to demonstrate a comprehensive working knowledge of:

a. Clearance and control.
b. Local procedures.
c. Emergencies and equipment outages.
d. Weather.
e. Recovery.

OJT: Allotted hours are located in Chapter 6 of this order.

OJT Checklist: The checklist for GC must be completed prior to certification on this position. The checklist is located in Appendix H of this order.

STAGE 3. Local Control (LC) and Cab Coordinator (CC)
Course 55063

General: This stage of training is administered in three parts: Instructor-led Training, Table-top Simulation and OJT. The objective of this phase of training is to prepare the Trainee for OJT on the Local Control and Cab Coordinator positions.

Training Length: Up to 40 hours of instructor-led/self-study training will be allotted. FAA Academy lesson plans are not used for this phase of training.

Instructor-led Training: Each Trainee is required to demonstrate a comprehensive working knowledge of:

a. Tower Visibility.
b. Position associated equipment.
c. LC local procedures.
d. Position application of LOA's, directives, and appropriate publications and logs.
e. Position relief briefings.
f. Recovery.

Instructor-led Evaluation: Each specialist must satisfactorily complete the following evaluations with a score of 70% or greater (unless stated otherwise) in order to complete the Instructor-led phase:

a. MVA Evaluation
b. LC Written Evaluation
c. National Weather Service Tower Visibility Certification Examination, with a score of 80% or better, if not previously completed.
d. Terminal Radar Qualification Examination, with a score of 70% or better, if not previously completed.

Simulation Training: Up to 4 hours of Table-top simulation training will be allotted. Table-top simulation training is not pass/fail. Each Trainee is required to demonstrate a comprehensive working knowledge of:

a. Separation rules.
b. Clearance and control.
c. Local procedures.
d. Emergencies and equipment outages.
e. Weather.
f. Recovery.

OJT: Allotted hours are located in Chapter 6 of this order.

OJT Checklist: The checklist for LC/CC must be completed prior to certification on this position. The checklist is located in Appendix H of this order.

STAGE 4. Radar Flight Data (RD)
Course 55060

General: This stage of training is administered in two parts: Instructor-led Training and OJT. The objective of this phase of training is to prepare the Trainee for OJT on the Radar Data position.

Training Length: Up to 8 hours of instructor-led/self-study training will be allotted. FAA Academy lesson plans are not used for this phase of training.

Instructor-led Training: Each Trainee is required to demonstrate a comprehensive working knowledge of:

a. Position associated equipment.
b. RD local procedures.
c. Position application of LOA's, directives, and appropriate publications and logs.
d. Position relief briefings.

Instructor-led Evaluation: The evaluation for this stage of training is combined with the Non-radar/Radar Written Examination.

Simulation Training: Simulation Training is not available for RD.

OJT: Allotted hours are located in Chapter 6 of this order.

OJT Checklist: The checklist for RD must be completed prior to certification on this position. The checklist is located in Appendix H of this order.

STAGE 5. Non-radar and Radar

Course 55064/55065

PHASE I

General: This stage of training is administered in three parts: Instructor-led Training, AT Coach Simulation and OJT. The objective of this phase of training is to prepare the Trainee for OJT on the Radar positions.

Training Length: Up to 72 hours of instructor-led/self-study training will be allotted. FAA Academy lesson plans are not used for this phase of training.

Instructor-led Training: Each Trainee is required to demonstrate a comprehensive working knowledge of:

a. Non-Radar operations and transition to back-up systems.
b. Contingency plan.
c. Position associated equipment.
d. Radar local procedures.
e. Position application of LOA's, directives, and appropriate publications and logs.
f. Position relief briefings.
g. Recovery.

Instructor-led Evaluation: Each specialist must satisfactorily complete the following evaluations with a score of 70% or greater in order to complete the Instructor-led phase:

a. MVA Evaluation
b. STARS Evaluation
c. Airways/Jet Routes Evaluation
d. MEA/MOCA Evaluation
e. Radio Frequencies Evaluation
f. Radar Video Map Evaluation
g. Topographical Map Evaluation
h. Non-radar/Radar Written Evaluation

Simulation Training: Up to 80 hours of AT Coach simulation training will be allotted. If additional hours are deemed necessary, a maximum of 80 additional hours will be provided.

There are five types of scenarios: Familiarization, Instructional, Recovery, Preparatory, and Evaluation, which have been developed for the following positions: Radar Finals, Radar Satellites, and Radar Sectors. These scenarios are administered in a progressive order based upon complexity and volume to meet the student's current knowledge level. Thus, not all instructional scenarios are required for all students. The instructor must determine which scenarios are required based upon the student's progress and abilities.

Scenario volume is determined by taking the busiest one-hour period on the seventieth-busiest day at the facility in a given calendar year. The figures used for the development of these scenarios are:

Radar Sectors – 44, Radar Finals – 27, and Radar Satellites – 44. Scenario complexity is rated on a scale of 1-5, with 1 being the least complex, and 5 being the greatest complexity.

AT Coach Simulation training is pass/fail. There will be a pre-evaluation scenario prior to each evaluation scenario. The Trainee must pass the following evaluations to successfully complete this stage of training:

a. Evaluation 1 – 70% Volume
b. Evaluation 2 – 90% Volume

Evaluations are graded IAW JO 3120.4R page B-4 and table B-1.

RADAR Simulation Training Outline

	FINALS SCENARIOS	SECTORS	SATELLITE
1.)	18 FINAL 1	1A	5B
2.)	18 FINAL 2	2C	6A
3.)	18 FINAL 3	1B	7B
4.)	FINALS 10A	2A	8A
5.)	FINALS 11B	3A	8D
6.)	FINALS 12BC	2D	8B
7.)	FINALS 23A	17A	14A
8.)	FINALS 24C	18D	19A
9.)	FINALS 26B	29B	14B
10.)	FINALS 37A	30CB	19B
11.)	FINALS 39A	31A	
12.)	FINALS 38B	32B	
13.)	FINALS 40B	32A	

PRE- EVALUATION SCENARIOS	EVALUATION SCENARIOS
PRACTICE EVALUATION 1	EVALUATION 1 (70%)
PRACTICE EVALUATION 2	EVALUATION 2 (90 %)

RECOVERY SCENARIOS

CAP_ZU02	SECTOR 2B	FINALS 11A	FINALS 25DA

PHASE II

CLASSROOM and SIMULATOR TRAINING

Once the Trainee reaches 70 hours of radar training the training team supervisor will coordinate with the staff office a time for this training to be completed. The training will be a minimum of 8 hours and will include classroom and simulator training. The minimum instruction will be: effects of weather (WX) on aviation (ICING, TURBULENCE, THUNDERSTORMS and AIRCRAFT WX RADAR etc), WX deviations, F16 Operations (SFO's, Overhead, Flight break-ups etc), Circling Approaches, Speed Control and IFR to VFR Conflict. The supervisor of the training team should advise the staff office of additional items they would like to be covered during this training.

OJT: Allotted hours are located in Chapter 6 of this order.

OJT Checklist: The checklist for Radar must be completed prior to certification on the first Radar position. The checklist is located in Appendix H of this order.

Appendix B. TUL Controller-in-Charge (CIC) Instructional Program Guide (IPG)

This IPG includes information about the following two development stages:

1. eLMS Course **57060002** CIC Terminal/Flight Service
2. Facility CIC Course **55073001**, Terminal Part A

Note – All specialists at TUL are required to become CIC qualified. Prior to being designated as a CIC, specialists must meet the prerequisites described in FAA JO 7210.3. Instructor-led training may be completed prior to the prerequisites being met.

1. STAGE 1: eLMS Course 57060002 CIC Terminal/Flight Service

General: The Web-Based-Training (WBT) course is designed to provide participants with the knowledge of a supervisory set of skills for air traffic operations and personnel management in the terminal and FSS operational environment when a supervisor is away from his/her duty.

Training Length: This training is self-paced and may take up to six hours to complete.

1. **STAGE 2. Facility CIC Course 55073001, Terminal Part A**

General: This stage of training is administered in two parts: Instructor-led Training and OJT. The objective of this phase of training is to prepare the CPC for OJT on the CIC position.

Training Length: Up to 12 hours of instructor-led/self-study training will be allotted.

Instructor-led Training: Each CPC is required to demonstrate a comprehensive working knowledge of:

a. Watch supervision requirements.
b. Operations management.
c. Resource management.
d. Unusual situations.
e. Accidents/Incidents.
f. Human relations and communications.
g. Leave Administration.
h. Medical/drug/alcohol regulations.
i. Reported occurrences.
j. Training procedures.
k. Work environment and human relations.

OJT: Allotted hours for this stage of training are:

EXPERIENCE	OJT TARGET HOURS	OJT MINIMUM CERTIFICATION HOURS
Prior CIC	5	4
No Prior CIC	10	4

OJT Checklist: The checklist for CIC must be completed prior to certification on this position. The checklist is located in Appendix H of this order.

Appendix C. Facility Operational Supervisor (OS) Instructional Program Guide (IPG)

General: This stage of training will be conducted IAW JO 3120.4R. This will include Stage 2 CIC training from Appendix B.

Training Length: Up to 12 hours of instructor-led/self-study training will be allotted.

Instructor-led Training: Each Operation Supervisor is required to demonstrate a comprehensive working knowledge of the items listed in Appendix K disregarding the En Route Area of Training.

Appendix D. Training Plan, TUL Worksheet 3120-1

Training Plan

"[Name of Trainee:]" [Date:]

☐ Tower Category: ☐ TRACON Category:

Training Team

OS: [Name] **OJTI:** [Name]

OJTI: [Name] **OJTI:** [Name]

The purpose of this document is to outline the training objectives for [Name] **. The members of the training team agree to implement these objectives in a positive and timely manner. The training team will meet as needed to discuss** [Name] **'s training performance and will revise this training plan as appropriate.**

Objective Hours

The Trainee is authorized to perform OJT on the following positions and has been assigned OJT, Target Hours, and Minimum hours as listed:

POSITION							
OJF HOURS							
TARGET HOURS							
MINIMUM HOURS							

INCLUDE TRAINING OBJECTIVES
(Attach other sheet if necessary.)

Signatures

Forward to Training Department when completed

Trainee	**Date**	**Operations Supervisor**	**Date**
OJTI	**Date**	**OJTI**	**Date**
OJTI	**Date**	TRAX ☐	NTD ☐

TUL Worksheet 3120-1 (05/20)

Appendix E. Monthly OJT Progress Report, TUL Worksheet 3120-2

Monthly OJT Progress Report

For the month of: [Month:] , [Year:] **Date** [Date:]

Name of Trainee: [Name:]

Fill in the appropriate boxes below

Position	Time This Month	Total Time	Position	Time This Month	Total Time
FD			RF		
CD			RD		
GC			RE		
LCE			RSE		
LCW			RSW		
			RW		
OTHER					

Training Progress is: (check one) ☐ **SATISFACTORY** ☐ **UNSATISFACTORY**

Comments

OS Comments:

Trainee Comments:

Signatures

OS Signature: _____ **Date:**_____/_____/_____

Trainee Signature: _____ **Date:**_____/_____/_____

TRAX ☐ NTD ☐

TUL Worksheet 3120-2 (05/20)

Appendix F. OJTI EVALUATION/CERTIFICATION FORM 3120-151

FAA Form 3120-151: On-the-Job Instructor Evaluation/Certification Form

OJT INSTRUCTOR:	OS/STMC:	
DATE:	POSITION:	STAGE (if applicable):
PURPOSE: ☐ EVALUATION ☐ CERTIFICATION		

Job Function	Satisfactory	Unsatisfactory
1. Provides OJT in OJT in accordance with IPG; National, Regional, and Local Directives.		
2. Uses appropriate methods (lectures, discussions, demonstrations) in providing OJT.		
3. Provides feedback on performance; identifies strengths; suggests methods for improvement.		
4. Properly completes FAA Form 3120-25/-26/-32/-36.		
5. Maintains communications with OS/STMC regarding Trainee status.		

Comments

OS/STMC SIGNATURE	DATE
EMPLOYEE'S SIGNATURE	DATE

I certify that this employee meets the qualification requirements to conduct OJT on all positions in _____ – unless noted below.

SIGNATURE OF CERTIFIER	DATE:

FAA Form 3120-151 (09/20)

Appendix G. Skill Enhancement Training, TUL Worksheet 3120-5

Skill Enhancement Training

Name: "[Enter Name Here]" **Operations Supervisor** "[Enter Name Here]"

Skill Improvement Training : ☐ **Skill Development Training :** ☐	**Amount of Skill Enhancement:** "[Enter Amount of Time]"

Training Plan

(TRAINING MUST BE DOCUMENTED ON FAA FORM 3120-25)

Signatures

OS Signature: _____ **Date:**____/____/____

Controller Signature: _____ **Date:**____/____/____

TRAX ☐ NTD ☐

TUL Worksheet 3120-5 (04/21)

Appendix H. Supplemental OJT Time, TUL Worksheet 3120-6

Supplemental OJT Time

NAME OF TRAINEE: [Name:] **Date** [Date:]

TRAINING TEAM INPUT

TRAINING TEAM SIGNATURES

TRAINEE	**Date**	**OS**	**Date**
OJTI	**Date**	**OJTI**	**Date**
OJTI	**Date**		

AIR TRAFFC MANAGER

REVIEW ALL TRAINING DOCUMENTS_____ATM Initials

☐ **NOT APPROVED** ☐ **APPROVED (See Below)**

You have been assigned additional OJT Hours as indicated below. Certification, or Suspension of OJT, may occur prior to exhausting these hours. Should you exhaust these additional hours, your OS must conduct a Certification Skill Check and take one of the following actions: 1) Certification, or 2) Suspension of OJT

POSITION					
ADDITIONAL HOURS					

ATM	**Date**	**TRAINEE**	**Date**

TRAX ☐ NTD ☐

TUL Worksheet 3120-6 (05/20) **FORWARD TO TRAINING DEPARTMENT**

Flight Data (FD)/Clearance Delivery (CD) OJT Checklist

NOTE: The Trainee must be able to demonstrate knowledge of the following. Indicate with an "N/A" in the date column items on the checklist that do not pertain.

Name:		OJTI	Trainee	DATE
A.	**FDIO EQUIPMENT**			
	1) Printer/Monitors/Keyboards			
	2) Fields/Entries			
	3) Configuration (Daytime/Night-time)			
	4) Refill FPS			
B.	**COMMUNICATIONS EQUIPMENT (ETVS)**			
	1) Frequencies			
	2) Internal Landlines			
	3) External Landlines			
	4) Center Dial Lines			
	5) Headset Jacks – Adjustments			
	6) Emergency Jacks			
	7) Pet2000 Backup Radio			
C.	**Digital ATIS (D-ATIS)**			
	1) Accessing via Keyboard			
	2) Amending Pertinent Information			
	3) Sending New ATIS			
	4) Monitoring ATIS (Handset/ETVS/Speaker Box)			
	5) Manual ATIS – operation			
D.	**PRE-DEPARTURE CLEARANCE (PDC)**			
	1) Accessing via Keyboard			
	2) Amending Pertinent Information			
	3) Sending PDC			
	4) Verifying Aircraft Receipt of Clearance			
E.	**STARS**			
	1) Alphanumeric Keyboard			
	2) Keyboard Entries			
	a) Sign On			
	b) Pref Sets			
	c) Entering Flight Plans			
	1. LOCAL IFR			
	2. VFR and NAS VFR			
	3. SVFR			
	d) Make Flight Plan Amendments			
	1. Aircraft ID			
	2. Type			
	3. Scratch-Pad			
	4. Sector			
	5. Number of Aircraft in Formation Flights			
	e) Updating Systems Data Area			
F.	**DIGITAL CLOCKS – Time Checks**			

Flight Data (FD)/Clearance Delivery (CD) OJT Checklist

NOTE: The Trainee must be able to demonstrate knowledge of the following. Indicate with an "N/A" in the date column items on the checklist that do not pertain.

Name:		OJTI	Trainee	DATE
G.	**ASOS**			
	1) Sign-on/Log off			
	2) Entering/Removing Tower Visibility			
	3) Deciphering Information on Display			
H.	**IDS-4**			
	1) Update SIA Page			
	2) ATIS Code			
	3) Active Runway			
	4) Approach in Use			
	5) Updating NOTAM Page (as requested)			
I.	**AIRPORT USERS (Air Carrier, General Aviation, Military) Telephony**			
J.	**STRIP MARKING**			
	1) FDIO – NAS Printed IFR, VFR			
	2) Handwritten IFR, VFR, SVFR, VFR OTP			
	3) Flow Control release/VOID Times			
	4) Clearance Issued (PDC or Checkmark)			
	5) ATIS Code			
K.	**PIREPS – Disseminating**			
L.	**ISSUING CLEARANCES**			
	1) IFR			
	2) LOCAL IFR			
	3) VFR			
	4) SVFR			
	5) VFR-ON-TOP			
M.	**LETTERS OF AGREEMENT (LOA's)**			
	1) RVS – Flow Control Messages			
	2) ZME – 5,000 and below out airways for RZC, HRO, FSM, LIT			
	3) ZME – QAF OTS, 10,000 and below, out airways			
N.	**OBTAINING TMU FLOW CONTROL RELEASES**			
O.	**POSITION RELIEF BRIEFINGS**			
P.	**CRU-ART**			
	1) Signing on Position – Drag & Drop			
	2) Combining Positions			
Q.	**Emergencies**			
	1) Contingency Plans			
	2) CFR Phone			
	3) Notification			

Flight Data (FD)/Clearance Delivery (CD) OJT Checklist

NOTE: The Trainee must be able to demonstrate knowledge of the following. Indicate with an "N/A" in the date column items on the checklist that do not pertain.

Name:	OJTI	Trainee	DATE

I certify that all items in this checklist have been completed and/or discussed. (Return to Training Department when completed.)

	Print Name	Signature	Date
Trainee			
OJT-Instructor			
Operations Supervisor			

Signatures below indicate you agree the Trainee is ready for certification on the FD/CD position.

	Print Name	Signature	Date
OJT Instructor			
OJT Instructor			

Ground Control (GC) OJT Checklist

NOTE: The Trainee must be able to demonstrate knowledge of the following. Indicate with an "N/A" in the date column items on the checklist that do not pertain.

Name:		OJTI	Trainee	DATE
A.	**EQUIPMENT**			
	1) ETVS Frequencies			
	2) RVR Digital Panel			
	3) IDS-4; SIA			
	4) Light Gun			
	5) TDW – P1 List			
	6) Airport Ground Lighting Panel – Operation			
	7) Approach Lighting			
	8) ITWS			
	9) Barrier Panel			
B.	**WEATHER**			
	1) Issue RVR Information			
	2) Issue Hazardous In-Flight Weather Advisories			
	3) Solicit/Issue/Relay PIREPs			
	4) Relay Braking Action Advisories			
C.	**AIRPORT LAYOUT**			
	1) Runways			
	2) Taxiways			
	3) Movement/Non-Movement Areas			
	4) Special Use Areas			
	a) Compass Rose			
	b) Hot Cargo			
	c) Hijack			
	d) Bomb Threat			
	e) Run-up Areas			
	5) Hangars – Numbers/Location			
	6) FBO's – Location/Services/Freqs (if available)			
	7) Radio Transmitter/Receiver Sites			
	8) Non-Visible Areas (LA, LZ, NN, QQ)			
	9) Station 51			
	10) ILS Critical Areas – 18L, 18R, and 36R			
	11) Intersection Departure Distance Remaining – All Runways			
D.	**STRIP MARKING**			
	1) Runway Assignment			
	2) ATIS Code or "WX"			
	3) Intersection Departure			
	4) Taxi Time			
	5) Secondary/Non-Advertised Runway Jet Departures			

Ground Control (GC) OJT Checklist

NOTE: The Trainee must be able to demonstrate knowledge of the following. Indicate with an "N/A" in the date column items on the checklist that do not pertain.

Name:		OJTI	Trainee	DATE
E.	**COORDINATION**			
	1) Runway Crossings/Complete			
	2) Non-advertised Runways			
	3) Taxiways F is blocked (RWY 18L in use)			
	4) Runway 8 APCH on TWY M			
F.	**PHRASEOLOGY**			
G.	**LETTERS OF AGREEMENT (LOA's)**			
H.	**EMERGENCY STANDBY POSITIONS**			
I.	**POSITION RELIEF BRIEFINGS**			

I certify that all items in this checklist have been completed and/or discussed. (Return to Training Department when completed.)

	Print Name	Signature	Date
Trainee			
OJT-Instructor			
Operations Supervisor			

Signatures below indicate you agree the Trainee is ready for certification on the GC position.

	Print Name	Signature	Date
OJT Instructor			
OJT Instructor			

Local Control (LC)/Cab Coordinator (CC) OJT Checklist

NOTE: The Trainee must be able to demonstrate knowledge of the following. Indicate with an "N/A" in the date column items on the checklist that do not pertain.

Name:		OJTI	Trainee	DATE
A.	**EQUIPMENT**			
	1) ETVS Frequencies			
	2) RVR Digital Panel			
	3) IDS-4; SIA			
	4) Light Gun			
	5) TDW			
	6) Airport Ground Lighting Panel – Operation			
	7) Approach Lighting			
	8) ITWS			
	9) Barrier Panel			
	10) ILS Panel			
	11) Cat II Operations			
	12) RADAR Panel			
B.	**WEATHER**			
	1) Issue RVR Information			
	2) Issue Low Level Wind Shear/Microburst Advisories			
	3) Issue Hazardous In-Flight Weather Advisories			
	4) Solicit/Issue/Relay PIREPs			
	5) Issue Braking Action Advisories			
	6) Take Tower Visibility Reports			
C.	**STARS ENTRIES**			
	1) Initiate/Accept/Unable Automated Pointouts			
	2) Initiate Flight Plan			
	3) Initiate/Accept Handoffs			
	4) Modify Scratch Pad			
	5) Initiate PTL on Tracks			
	6) Adjust History			
	7) Select/Deselect Weather			
	8) Pref-sets			
	9) Vehicle On Runway			
D.	**STRIP MARKING**			
	1) VFR Prop - Circle On-course			
	2) IFR Prop Headings			
	3) Departure Times			
	4) Secondary Runway Jets			
E.	**GENERAL**			
	1) Safety Alerts			
	2) Traffic Advisories/Information			
	3) Bird Activity Advisories			
	4) Wheels Down Check			

Local Control (LC)/Cab Coordinator (CC) OJT Checklist

NOTE: The Trainee must be able to demonstrate knowledge of the following. Indicate with an "N/A" in the date column items on the checklist that do not pertain.

	Name:	OJTI	Trainee	DATE
	5) Runway Selection – Calm Wind Runway			
	6) Formation Flights			
	7) TCAS Resolution Advisories			
	8) Snow Removal Procedures			
	9) Closed Runway Strip			
	10) Split Locals			
F.	**ARRIVAL/DEPARTURE PROCEDURES AND SEPARATION**			
	1) Same Runway Separation			
	2) Parallel Runway Use			
	3) Intersecting Runway Separation			
	4) Wake Turbulence Separation			
	5) IFR Arrival/Departure Separation			
	6) IFR Successive Departure Separation			
	7) IFR Prop Headings			
	8) Closed Traffic			
	9) VFR Transition A/C			
	10) VFR Prop Headings			
	11) Helicopter Operations			
	12) Planned/Unplanned Missed Approaches			
	13) Emergency Aircraft			
	14) SVFR Aircraft			
	15) Aircraft with Release and Void Times			
	16) Handling Go-Around Aircraft			
	17) Apply Visual Separation			
	18) Provide Class-C Service			
	19) Tower Assumes Responsibility (TAR)			
	20) Visual Separation of Instrument Approach Aircraft to Crossing Runways			
	21) STARS Auto-Acquisition			
G.	**LETTERS OF AGREEMENT (LOA's)**			
	1) MARSA			
	2) Overhead Pattern Maneuvers			
	3) SFO/SI SFO Maneuvers			
	4) Braking Action			
	5) John Zink Flares			
	6) Airport Emergencies			
	7) Coded Lunar Departures			
H.	**CONTINGENCY PLAN**			
I.	**PHRASEOLOGY**			
J.	**POSITION RELIEF BRIEFINGS**			

Local Control (LC)/Cab Coordinator (CC) OJT Checklist

NOTE: The Trainee must be able to demonstrate knowledge of the following. Indicate with an "N/A" in the date column items on the checklist that do not pertain.

Name:	OJTI	Trainee	DATE

I certify that all items in this checklist have been completed and/or discussed. (Return to Training Department when completed.)

	Print Name	Signature	Date
Trainee			
OJT-Instructor			
Operations Supervisor			

Signatures below indicate you agree the Trainee is ready for certification on the LC/CC position.

	Print Name	Signature	Date
OJT Instructor			
OJT Instructor			

Radar Data (RD) OJT Checklist

NOTE: The Trainee must be able to demonstrate knowledge of the following. Indicate with an "N/A" in the date column items on the checklist that do not pertain.

Name:		OJTI	Trainee	DATE
A.	**FDIO EQUIPMENT**			
	1) Fields/Entries			
	2) Configuration (Daytime/Night-time)			
B.	**COMMUNICATIONS EQUIPMENT (ETVS)**			
	1) Landlines			
	2) Emergency Jacks			
	3) Pet2000 Backup Radio			
C.	**DIGITAL CLOCKS – Time Checks**			
D.	**PROCESSING FLIGHT PROGRESS STRIPS**			
	1) Secondary Airport Departures			
	2) Overflights			
	3) SIGMET, AIRMET, CWA			
	4) NAS Status messages and TMU messages			
E.	**STRIP MARKING**			
F.	**ISSUING CLEARANCES**			
	1) To Pilot - Recorded line			
	2) To AFSS			
	3) RVS when RVS equipment is OTS			
G.	**OBTAINING TMU FLOW CONTROL RELEASES**			
H.	**POSITION RELIEF BRIEFINGS**			
I.	**EMERGENCIES**			

I certify that all items in this checklist have been completed and/or discussed. (Return to Training Department when completed.)

	Print Name	Signature	Date
Trainee			
OJT-Instructor			
Operations Supervisor			

Signatures below indicate you agree the Trainee is ready for certification on the RD position.

	Print Name	Signature	Date
OJT Instructor			
OJT Instructor			

RADAR OJT Checklist

NOTE: The Trainee must be able to demonstrate knowledge of the following. Indicate with an "N/A" in the date column items on the checklist that do not pertain.

Name:		OJTI	Trainee	DATE
A.	**EQUIPMENT**			
	1) ETVS			
	2) ITWS			
	3) RVR			
	4) IDS-4			
	5) STARS			
	a) Enter/Amend Flight Plans			
	b) Enter/Amend Scratch Pad Data			
	c) Filter Limits			
	d) Select/Deselect Weather			
	e) FSL/ESL			
	f) Quicklook			
	g) Emergency Airports			
	h) Radar Selection			
	i) Position Configurations			
	j) Combine/De-combine Keyboards			
	k) Display Appropriate Maps			
B.	**WEATHER**			
	1) Issue RVR Information			
	2) Issue Hazardous In-Flight Weather Advisories			
	3) Solicit/Issue/Relay PIREPs			
	4) Non-Controlled Airports			
C.	**EMERGENCIES**			
	1) Emergency Information Requirements			
	2) Control Emergency Aircraft			
	3) Hijack Procedures			
	4) Emergency Locator Transmitter (ELT) Signals			
	5) VFR Aircraft in weather Difficulty			
	6) Bomb Threat Procedures			
	7) Overdue Aircraft Procedures			
	8) Loss of Communications			
D.	**GENERAL**			
	1) Duty Priority			
	2) Operational Priority			
	3) Expeditious Compliance			
	4) Safety Alerts			
	5) Minimum/Emergency Fuel			
	6) NAVAID Malfunction/Outages			
	7) Formation Flights			
	8) Transfer Control/Radio Communications			
	9) Wake Turbulence Cautionary Advisories			
	10) Wake Turbulence Separation Criteria			

RADAR OJT Checklist

NOTE: The Trainee must be able to demonstrate knowledge of the following. Indicate with an "N/A" in the date column items on the checklist that do not pertain.

	Name:	OJTI	Trainee	DATE
	11) Traffic Advisories			
	12) Bird Activity			
	13) Transfer Position Responsibility			
	14) TCAS Resolution Advisories			
	15) Use of Flight Progress Strips			
	16) Team Position Responsibilities			
	17) Inter/Intra Facility Coordination			
	18) Calm Wind Runway			
E.	**IFR**			
	1) Departure Clearances			
	a) Formulate/Issue Clearances			
	b) Departure Restrictions			
	c) Release/Void Times			
	d) Hold For Release			
	e) VFR - IFR Flights			
	f) Altitude Restrictions			
	2) Readback of Altitude Assignments			
	3) Route Assignments			
	4) Holding Instructions			
	5) Arrival Procedures			
	a) Arrival Information			
	b) Weather Information			
	c) Approach Information			
	d) Single Frequency Approaches			
	6) Approach Clearance Procedures			
	a) Approach Clearance			
	b) Specifying Altitude			
	c) Circling Approach			
	d) Missed Approach			
	e) Practice Approaches			
	f) High Approaches (TACAN RWY 26)			
F.	**RADAR**			
	1) Merging Target Procedures			
	2) Beacon Code Assignments			
	a) TUL IFR Code Bank			
	b) TUL VFR Code Bank			
	c) RVS VFR Code Bank			
	d) Emergency Code			
	e) No Radio Code			
	f) Hijack Code			
	3) Mode C Confirmation			

RADAR OJT Checklist

NOTE: The Trainee must be able to demonstrate knowledge of the following. Indicate with an "N/A" in the date column items on the checklist that do not pertain.

	Name:	OJTI	Trainee	DATE
	4) Methods of Radar Identification			
	5) Transfer of Radar Identification			
	a) Make/Receive Automated/Manual Handoffs			
	b) Make/Receive Automated/Manual Pointouts			
	c) Issue/Observe Traffic			
	d) Interfacility Automated Information Transfer			
	e) Prearranged Coordination			
	6) Radar Separation			
	a) Target Separation/Resolution			
	b) Vertical Separation			
	c) Passing or diverging			
	d) Formation Flights			
	e) From Obstructions			
	f) Edge of Scope			
	g) From Adjacent Airspace			
	7) Vectoring			
	a) MVA			
	8) Speed Control			
	9) Departures			
	a) IFR Headings			
	b) VFR Headings			
	c) RW/RE Responsibilities			
	10) Arrivals			
	a) Vectors to Final Approach Course			
	b) Final Approach Course Interception			
	c) Vectors Across Final Approach Course			
	d) Parallel Dependent ILS Approaches (Staggered)			
	e) Approach Separation Responsibility			
	11) ASR Approaches			
	a) Approach Information			
	b) No-Gyro			
	c) Lost Communications			
	d) Position Information			
	e) Final Controller Changeover			
	f) Communications Check			
	g) Transmission Acknowledgement			
	h) Altitude Information			
	i) Visual Reference Report			
	j) Descent Notification			
	k) Recommended Altitudes			
	l) Final Approach Guidance			

RADAR OJT Checklist

NOTE: The Trainee must be able to demonstrate knowledge of the following. Indicate with an "N/A" in the date column items on the checklist that do not pertain.

Name:		OJTI	Trainee	DATE
	m) Tower Clearance			
	n) Missed Approach			
	o) Approach Guidance Termination			
G.	**VISUAL**			
	1) Visual Separation			
	2) VFR-On-Top			
	3) Visual Approaches			
	a) Vectors For Visual Approach			
	b) Weather Minimums			
	c) Clearance for Visual Approach			
	d) Multiple Runways			
	e) Contact Approach			
	f) Visually Following/Visually Separated			
	4) Special VFR			
	a) Visibility Requirements			
	b) Quadrants			
	c) Separation			
	d) Lunar Helicopters			
	e) RVS Operations			
	5) Class C Service			
	a) Separation			
	b) Establishing 2-Way Communications			
	c) Altitude Assignments			
	d) Termination			
	6) Basic Radar Service to VFR Aircraft			
	a) Service Availability			
	b) Non-Participating Aircraft			
	c) Sequencing			
	d) Control Transfer			
	e) Traffic Advisories			
	f) Termination			
	g) Service Provided When RVS Tower is Closed			
	7) Overhead Approaches			
	8) SFO Approaches			
H.	**SPECIAL FLIGHTS**			
	1) Flight Check Aircraft			
	2) Hung Ordinance			
	3) Pipeline Aircraft			
	4) Non-standard Formation Flights			
	5) Aircraft Dumping Fuel			
	6) Parachute Jumping Operations			

RADAR OJT Checklist

NOTE: The Trainee must be able to demonstrate knowledge of the following. Indicate with an "N/A" in the date column items on the checklist that do not pertain.

	Name:	OJTI	Trainee	DATE
	7) Lifeguard/Med Evac/Air Evac Operations			
	8) Suspicious Activities			
	9) Law Enforcement Operations			
I.	**LETTERS OF AGREEMENT (LOA's)**			
J.	**CONTINGENCY PLAN**			
K.	**POSITION RELIEF BRIEFINGS**			

I certify that all items in this checklist have been completed and/or discussed. (Return to Training Department when completed.)

	Print Name	Signature	Date
Trainee			
OJT-Instructor			
Operations Supervisor			

Signatures below indicate you agree the Trainee is ready for certification on the Radar_____ position.

	Print Name	Signature	Date
OJT Instructor			
OJT Instructor			

CONTROLLER –IN-CHARGE (CIC) OJT Checklist

NOTE: The CPC must be able to demonstrate knowledge of the following. Indicate with an "N/A" in the date column items on the checklist that do not pertain.

	Name:	OJTI	Trainee	DATE
A.	**CIC RESPONSIBILITIES**			
	Assign OJT			
	Combine/De-combine Positions			
	Ensure Available Resources are Deployed for the Optimal Efficiency			
	Identify Need for Overtime			
	Implement Contingency Plans			
	Make Position Assignments			
	Monitor Weather for Impacts on Air Traffic			
	Monitor/Configure Equipment			
	Process and Document FAA/Facility Forms			
	Process Leave Requests (as appropriate)			
	Provide Breaks			
	Respond to Unusual Situations /Emergencies/Accidents and Incidents			
B.	**HUMAN RELATIONS**			
	Coordinate Special Operations			
	Eliminate Distractions			
	Handle Public Complaints			
	Identify and Report Harassment Incidents			
	Make on-the-spot Corrections			
	Respond to Information Request			
C.	**OPERATIONS MANAGEMENT**			
	Adhere to Guidance/Goals for the Shift			
	Comply with Labor Contract Requirements			
	Conduct and Receive Position Relief Briefings			
	Crew Briefing/Make-ups			
	Demonstrate Runway Selection Responsibilities			
	ELT Reports			
	Flight Progress Strips Collection			
	IDS-4 Operation and Entries			
	Maintains Situational Awareness			
	Mandatory Briefing Requirements			
	NAVAID Status Dissemination			
	NOTAM Dissemination			
	OPSNET Reporting			
	Prevent OE/OD			
	Provide Assistance to Specialists			
	Report and Process Preliminary OE/D Reports			
	Report Equipment Malfunctions			
	Supplies			
	Through Simulation, Respond to Bomb Threats/ Highjacking/UFO Reports			
	Watch Checklist			
	Weather Information and Dissemination			

CONTROLLER –IN-CHARGE (CIC) OJT Checklist

NOTE: The CPC must be able to demonstrate knowledge of the following. Indicate with an "N/A" in the date column items on the checklist that do not pertain.

	Name:	OJTI	Trainee	DATE
	When Necessary, Implement Flow Control			
D.	**GENERAL**			
	Airfield Lighting			
	Automated 7230-4			
	E and Q Entries			
	Emergency Radios			
	Headsets/Handsets			
	Runway Changes			
	TM Initiatives/No Notice Holding/Ground Stop			
	TMU Coordination			
E.	**UNUSUAL SITUATIONS**			
	Complete and Forward Daily Forms			
	Emergencies (QAR)			
	ESL Procedures			
	Flight Assists (QAR)			
	INREQ/ALNOT			
	Near Mid-air Collisions (QAR)			
	Pilot Deviations (QAR)			
	Presidential Movement			
	TCAS RA (QAR)			
	Telephone Use			

I certify that all items in this checklist have been completed and/or discussed. (Return to Training Department when completed.)

	Print Name	Signature	Date
Certified Professional Controller			
Operations Supervisor			

BRIEFING ITEM TITLE: Notice 7110.766 Landing Clearance (Wrong Surface Landings)

8/28/2019						19-182		
Date / Initials		CEDAR	Date / Initials		CEDAR	Date / Initials		CEDAR
9/11	Andrews, N	✓	9/9	Estes, J	✓	9/12	Marino, A	✓
9/6	Atkins, B.	✓	8/30	Field, B	✓	9/10	McMillan, M	✓
9/5	Batman, D	✓	8/30	Flynn, S	✓	8/30	Mosher, M.	✓
N/A	Biggs, T	✓	9/9	Genske, C	✓	9/5	Niklos, A	✓
9/12	Bradford, P	✓	9/12	Greene, R	✓	9/9	**Pettigrove, T**	✓
9/11	Brown, J.	✓	9/9	Harkey, S.	✓	8/30	Perkins, J.	✓
9/12	Bui, K.	✓	8/30	Hein, J	✓	8/30	Skogen, P	✓
8/29	Burton, J	✓	9/9	Hopson, D.	✓	9/3	Smith, B	✓
8/30	Carder, C	✓	9/12	Hopson, K.	✓	9/3	Smirz, K	✓
9/3	**Cheatham, B**	✓	9/3	Kaiser, K.	✓	9/3	Taylor, M.	✓
N/A	Crone, T	✓	9/6	Karkiewicz, A.	✓	9/9	Tookey, B	✓
N/A	Davis, G	—	N/A	Majors, G	—	9/5	**Vidacak, J.**	✓
9/12	Densmore, C.	✓				9/3	**Wood, B**	✓
9/9	Doyle, T	✓				8/30	Zalfen, J	✓

VERIFY THAT THIS BRIEFING HAS BEEN COMPLETED BY PLACING BRIEFING DATE AND INITIALS OF BRIEFER

19-182

Notice 7110.766 Landing Clearance (Wrong Surface Landings)

Z: Drive - Cedar Briefings, 2019, 19-182

NOTICE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
Air Traffic Organization Policy

N JO 7110.766

Effective Date:
September 23, 2019

Cancellation Date:
January 30, 2020

Briefing Item # 19-182

SUBJ: Landing Clearance (Wrong Surface Landings)

1. Purpose of This Notice. This notice requires controllers to take action when they have become aware that an aircraft is about to land on the wrong surface.

2. Audience. This notice applies to the following Air Traffic Organizations (ATO) service units: Air Traffic Services and associated air traffic control towers, Mission Support, and System Operations.

3. Where Can I Find This Notice? This notice is available on the MyFAA employee website at https://employees.faa.gov/tools_resources/orders_notices/ and on the air traffic publications website at http://www.faa.gov/air_traffic/publications/.

4. Cancellation. This notice is canceled with the publication of FAA Order JO 7110.65Y, Change 1, on January 30, 2020.

5. Explanation of Policy Change. This change adds guidance to FAA Order JO 7110.65, Air Traffic Control, for controllers when they become aware an aircraft is about to land and has aligned to the wrong surface. When controllers become aware that an aircraft has aligned to the wrong surface, the controller must inform the pilot and issue control instructions/clearances. If time permits, the controller will notify the pilot of the misalignment and have the pilot verify the landing runway.

6. Procedures/Responsibilities/Action. Amend FAA Order JO 7110.65, paragraph 3-10-5, to read as follows:

3-10-5. LANDING CLEARANCE

Title thru a. Note, no change

b. When you become aware that an aircraft is aligned with the wrong surface, inform the pilot and:

1. Issue control instructions/clearances, or

EXAMPLE-

"United four twenty three, go-around, you appear to be aligned with the wrong runway."

"American sixty three, go-around, you appear to be aligned with a taxiway."

Distribution: Electronic

Initiated By: AJV-8

"Southwest two thirty nine, you appear to be aligned with Runway 27 Left (pertinent information), Runway 27 Left, cleared to land."

2. If time permits, verify the pilot is aligned with the correct runway. Issue control instructions/clearances as necessary.

EXAMPLE-

"Twin Cessna four one four lima bravo, verify you are aligned with Runway 27 Left."

REFERENCE-
FAA Order JO 7110.65, Para 3-6-4, Safety Logic Alert Responses.
FAA Order JO 7110.65, Para 3-10-8, Withholding Landing Clearance.

Re-letter b. thru f. as c. thru g.

7. **Distribution**. This notice is distributed to the following ATO service units: Air Traffic Services, Mission Support Services, System Operations, Safety and Technical Training; the Air Traffic Safety Oversight Service; the William J. Hughes Technical Center; and the Mike Monroney Aeronautical Center.

8. **Background**. Wrong Surface Landings (WSL) have been an ongoing issue in the National Airspace System (NAS) for several years. In 2017, WSLs became one of the Air Traffic Organization's (ATO) Top Five (5) Safety issues/hazards. Reducing wrong surface events is one of the FAA's top priorities. During reviews of these WSL events, a trend of controller inaction has been identified, particularly when an aircraft is between a one mile final and the runway threshold. In these instances, the data showed that controllers often stated the aircraft was in a "critical phase of flight," and they felt it was best not to issue control instructions. This inaction is unacceptable and control instructions must be issued. Mandatory Occurrence Reports also indicate that in some cases, controllers see an aircraft aligned to the wrong runway and fail to issue a landing clearance or go-around instructions.

[redacted]

Natking Estevez
Director (A), Air Traffic Procedures
Air Traffic Organization

8/22/19
Date Signed

BI # 20-079

NOTICE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
Air Traffic Organization Policy

N JO 7110.766

Effective Date:
September 23, 2019

Cancellation Date:
January 30, 2020

SUBJ: Landing Clearance (Wrong Surface Landings)

1. Purpose of This Notice. This notice requires controllers to take action when they have become aware that an aircraft is about to land on the wrong surface.

2. Audience. This notice applies to the following Air Traffic Organizations (ATO) service units: Air Traffic Services and associated air traffic control towers, Mission Support, and System Operations.

3. Where Can I Find This Notice? This notice is available on the MyFAA employee website at https://employees.faa.gov/tools_resources/orders_notices/ and on the air traffic publications website at http://www.faa.gov/air_traffic/publications/.

4. Cancellation. This notice is canceled with the publication of FAA Order JO 7110.65Y, Change 1, on January 30, 2020.

5. Explanation of Policy Change. This change adds guidance to FAA Order JO 7110.65, Air Traffic Control, for controllers when they become aware an aircraft is about to land and has aligned to the wrong surface. When controllers become aware that an aircraft has aligned to the wrong surface, the controller must inform the pilot and issue control instructions/clearances. If time permits, the controller will notify the pilot of the misalignment and have the pilot verify the landing runway.

6. Procedures/Responsibilities/Action. Amend FAA Order JO 7110.65, paragraph 3-10-5, to read as follows:

3-10-5. LANDING CLEARANCE

Title thru a. Note, no change

b. When you become aware that an aircraft is aligned with the wrong surface, inform the pilot and:

1. Issue control instructions/clearances, or

EXAMPLE-

"United four twenty three, go-around, you appear to be aligned with the wrong runway."

"American sixty three, go-around, you appear to be aligned with a taxiway."

"Southwest two thirty nine, you appear to be aligned with Runway 27 Left (pertinent information), Runway 27 Left, cleared to land."

2. If time permits, verify the pilot is aligned with the correct runway. Issue control instructions/clearances as necessary.

EXAMPLE-

"Twin Cessna four one four lima bravo, verify you are aligned with Runway 27 Left."

REFERENCE-
FAA Order JO 7110.65, Para 3-6-4, Safety Logic Alert Responses.
FAA Order JO 7110.65, Para 3-10-8, Withholding Landing Clearance.

Re-letter b. thru f. as c. thru g.

7. Distribution. This notice is distributed to the following ATO service units: Air Traffic Services, Mission Support Services, System Operations, Safety and Technical Training; the Air Traffic Safety Oversight Service; the William J. Hughes Technical Center; and the Mike Monroney Aeronautical Center.

8. Background. Wrong Surface Landings (WSL) have been an ongoing issue in the National Airspace System (NAS) for several years. In 2017, WSLs became one of the Air Traffic Organization's (ATO) Top Five (5) Safety issues/hazards. Reducing wrong surface events is one of the FAA's top priorities. During reviews of these WSL events, a trend of controller inaction has been identified, particularly when an aircraft is between a one mile final and the runway threshold. In these instances, the data showed that controllers often stated the aircraft was in a "critical phase of flight," and they felt it was best not to issue control instructions. This inaction is unacceptable and control instructions must be issued. Mandatory Occurrence Reports also indicate that in some cases, controllers see an aircraft aligned to the wrong runway and fail to issue a landing clearance or go-around instructions.

[redacted]

Natking Estevez
Director (A), Air Traffic Procedures
Air Traffic Organization

8/22/19
Date Signed

BRIEFING ITEM TITLE: N. JO. 7110.766 WRONG SURFACE LANDING

DATE 01/27/2020

BI#: 20-079

Date / Initials		C	Date / Initials		C	Date / Initials		C
2/10	Andrews, N		2/11/2020	GARDNER, M		2/9	Nichlos, A	
1/31	Atkins, B.		1/27	Genske, C		1/31	Perkins, J.	
2/10	Batman, D		1/27	GREENE, R		1/28	*Pettigrove,T*	
[redacted]	Bradford, P		2/11	GROSCHICK,T		[redacted]	Skogen, P	
1/28	Brown, J		2/1	Harkey, S.		2-12	Smirz, K	
2/2	Bui, K.		2/14	Hein, J		2/9	SUTCLIFFE, M	
2/11	Burton, J		2/2	Hopson, D.		1/28	Smith, B	
2/3	CARDER, C		1/31	Hopson, K		1/28	Taylor, M.	
1/27	*Cheatham, B*		1/27	Kaiser, K		1/28	B. TOOKEY	
2/10	Densmore,C		1/30	Karkiewicz, A.		1/31	*Vidacak, J.*	
[redacted]	~~DOYLE, T~~		2/12	Marino, A		2/3	*Wood, B.*	
1/28 1/21	Estes, J.		2/3	McMillan, M		1/28	Zalfen, J	
1/21	Flynn, S.		2/12	Mosher, M.				

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BI# 20-079

GIVEN BY FLM's

Who are FLM's

"W" drive: Cedar briefings/2020 Briefings

TULSA INTERNATIONAL ATCT/TRACON
Briefing Item

DATE: 11/5/20 **BRIEFING # :** 21-020

TITLE:

MEMO – Wrong Surface Intersection Departure Risk And Associated Short Video

Briefing Item Info

All,

Attached is a Memo from HQ, and discusses Wrong Surface Intersection Departure Risk.

Below that memo is a link to the video discussed in the memo. Please take a few moments to watch the video. It's only 2 minutes and 42 seconds long.

Thanks.

Federal Aviation Administration

Memorandum

Date: 10/28/2020

To: Distribution

Donald Britton McNeill Jr Digitally signed by Donald Britton McNeill Jr
Date: 2020.10.22 18:05:15 -04'00'

From: Jeffrey Szczygielski, Director, Operational Policy and Implementation, AJT-2

Subject: ACTION: Wrong Surface Intersection Departure Risk

Wrong surface departures, particularly intersection departures that depart opposite from the intended direction of flight, introduce risk into the system.

The unintended consequence of reduced traffic and lack of visual ques to pilots have led to an increased occurrence of these events.

These events can have a high risk factor by starting departure roll on a shorter than expected runway, experiencing a tailwind component that does not allow for sufficient runway required for departure, and the potential for collision with other aircraft and ground vehicles. On-going efforts to mitigate wrong surface operations range from raising controller and pilot awareness to broader cross–line of business initiatives.

A video was developed in an effort to raise awareness and continue to mitigate wrong surface intersection departures. Facilities are encouraged to work collaboratively with the NATCA Principal Facility Representative to conduct briefings to operational personnel. Please click the link to access the video (https://youtu.be/E0V7YRQJIvk).

These techniques can help mitigate wrong surface intersection departures:

- Consider a full-length departure unless an intersection departure is requested by the pilot
- When authorized, utilize Line Up and Wait from an intersection prior to issuing a take-off clearance
- Ensure the aircraft aligns with the correct surface when they take the active runway from an intersection to begin the takeoff roll

- If the aircraft starts departure in the wrong direction, immediately cancel take-off clearance
- If possible, issue a leading turn onto the runway to ensure correct alignment

If you have any questions, please contact Giovanni Dipierro, Runway Safety Group Manager, AJI-14, at Giovanni.Dipierro@faa.gov.

Distribution:
Franklin McIntosh, Director, Air Traffic Operations, Central Service Area, AJT-C
Calvin Rohan, III, Director, Air Traffic Operations, Eastern Service Area, AJT-E
Jeff Stewart, Director, Air Traffic Operations, Western Service Area, AJT-W
Steven Hansen, National Safety Representative, NATCA

Briefing Item # 21-020

Wrong Surface Intersection Departure Risk

Click the link below to watch this short video

https://www.youtube.com/watch?v=E0V7YRQJIvk&feature=youtu.be

Federal Aviation Administration

Memorandum

Date: 2/11/2022

To: Distribution

JEFFREY S SZCZYGIELSKI Digitally signed by JEFFREY S SZCZYGIELSKI Date: 2022.02.10 15:00:42 -05'00'

From: Jeffrey Szczygielski, Director, Operational Policy & Implementation, AJT-2

Subject: Current State of Wrong Surface Operations

Wrong surface departures and landings are considered higher risk safety events. Some of the factors that contribute in making these events higher risk can include a shorter than expected runway, tailwinds, and the potential for collision with aircraft and ground vehicles. Ongoing efforts to mitigate wrong surface operations range from raising controller and pilot awareness to broader cross-line of business initiatives**.** Wrong Surface operations continue to be an Air Traffic Organization Top 5 safety issue.

Recent events have once again highlighted the need to confirm correct read backs, ensure aircraft are aligned with the correct surface, and issue control instructions when an aircraft is not in compliance with the clearance as issued.

Although this is typically a General Aviation issue, during the past few weeks, there has been an increase in Air Carrier alignments and attempted landings on the wrong runway.

Together, the FAA and NATCA are addressing wrong surface operations. Over the last year, Runway Safety and NATCA have worked with Flight Standards and local pilot groups to raise awareness through local Runway Safety Action Team meetings, Safety webinars, and Outreach with external stakeholders. The FAA and NATCA have also developed the Surface Watch Recognition Program. This program acknowledges individuals and teams of controllers and supervisors for their exemplary saves and initiatives that focus on the surface environment. Links to an informational video regarding the program and the Surface Watch Recognition nomination form are included below.

In an effort to raise awareness and continue to mitigate wrong surface landings and departures, Facility Managers should work collaboratively with the NATCA Principal Facility Representative to conduct briefings to operational personnel and stakeholders at their airport. Facilities are encouraged to work with their local FAA Safety Teams to increase awareness with the pilot community.

If you have any questions or need further information, please contact Steve Pinkerton, Acting Team Manager, Technical Advisory Group, AJT-2210 at Steven.Pinkerton@faa.gov.

Attachments:

1. Link to Surface Watch Nomination Form. https://form.jotform.com/201684366662057
2. Link to Surface Watch Recognition Video https://youtu.be/hZbKm21puzM

Distribution:
Franklin McIntosh, Director, Air Traffic Operations, Central Service Area, AJT-C
Shaun Sanders, Director, Air Traffic Operations, Eastern Service Area, AJT-E
Jeff Stewart, Director, Air Traffic Operations, Western Service Area, AJT-W

BRIEFING ITEM TITLE: ATC RESPOSIBILITIES 7110.65Z

DATE: 6/14/2022

BI#: 22-092

Date / Initials		C	Date / Initials		C	Date / Initials		C
6/21 [redacted]	~~Andrews, N~~		6/21 [redacted]	Flynn, S.				
[redacted]	Arndt, A		6/21 [redacted]	GARDNER, M		6/21 [redacted]	Mosher, K.	
6/30 [redacted]	Atkins, B.		6/22 [redacted]	Genske, C		6/21 [redacted]	Mosher, M.	
7/7 [redacted]	Batman, D		7/7 [redacted]	GREENE, R		6/14 [redacted]	Nichlos, A	
6/14 [redacted]	BROWN, C		7/28 [redacted]	GROSCHICK,T		6/29 [redacted]	Perkins, J.	
[redacted]	Burton, J		6/30 [redacted]	Harkey, S.		6/21 [redacted]	QUADRI, T	
6/21 [redacted]	B. BYRNE		6/22 [redacted]	Hein, J		7/25 [redacted]	Smirz, K	
			6/22 [redacted]	[redacted]SON,D		7/22 [redacted]	SUTCLIFFE, M	
7/25 [redacted]	CARDER, C		6/21 [redacted]	Hopson, D.				
6/30 [redacted]	Densmore,C		6/21 [redacted]	Hopson, K		7/22 [redacted]	TOOKEY B.	
6/23 [redacted]	DOYLE, T		6/21 [redacted]	Karkiewicz, A		6/22 [redacted]	TOOKEY K.	
6/21 [redacted]	Estes, J.		6/21 [redacted]	Keel, R		6/21 [redacted]	Wood, B.	
6/24	FIELD, B		6/29 [redacted]	Marino, A		7/13 [redacted]	Zalfen, J	

VERIFY THAT YOU HAVE COMPLETED THIS ITEM BY PLACING

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BI: 22-092

ATC RESPONSIBILITIES 7110.65Z

TOWER WINDOWS OBSCURED WITH CONDENSATION

"W" drive: Cedar Briefings/2022 Briefings

TULSA INTERNATIONAL ATCT/TRACON
Briefing Item

DATE: 6/14/2022 **BRIEFING #** 22-092

TITLE: Air Traffic Control Responsibilities 7110.65Z

Briefing Item Info

A recent event has brought about reason for refresher training on air traffic control responsibilities according to the 7110.65Z. This is not an exhaustive list but will reference many areas. This includes NOTES, EXAMPLES and PHRASEOLOGY EXAMPLES. The procedures for the tower windows being obscured by condensation will also be briefed.

3-1-7 POSITION DETERMINATION

3-1-9 USE OF TOWER RADAR DISPLAYS
3-1-9 b.
3-1-9 b. 1.
3-1-9 b. 4.
NOTE:

3-1-12 VISUALLY SCANNING RUNWAYS
3-1-12 a.

3-7-2 i. TAXI AND GROUND MOVEMENT OPERATIONS
3-7-2 i. 3.
NOTE:

3-10-5 LANDING CLEARANCE
3-10-5 b.
3-10-5 b. 1.
EXAMPLES-
3-10-5 2.

3-10-7 LANDING CLEARANCE WITHOUT VISUAL OBSERVATION
PHRASEOLOGY EXAMPLE-

5-9-2 FINAL APPROACH COURSE INTERCEPTION
5-9-2 b.
5-9-2 b. 1.
5-9-2 b. 2.
PHASEOLOGY EXAMPLE-
NOTE:

PCG G-2 GO AROUND

TOWER WINDOWS OBSCURED BY CONDENSATION PROCEDURES

TB

TUL Briefing Item Worksheet (12/10)

3-1-7. POSITION DETERMINATION

Determine the position of an aircraft, personnel or equipment before issuing taxi instructions, takeoff clearance, or authorizing personnel, and/or equip-ment to proceed onto the movement area.

NOTE-
When possible, positions of aircraft, vehicles, equipment and/or personnel may be determined visually or through use of a display system. When ATC is unable to determine position visually or via a display system, position reports may be used.

3-1-9. USE OF TOWER RADAR DISPLAYS

b. Local controllers may use certified tower radar displays for the following purposes:

1. To determine an aircraft's identification, exact location, or spatial relationship to other aircraft.

NOTE-
This authorization does not alter visual separation procedures. When employing visual separation, the provisions of paragraph 7-2-1, VISUAL SEPARATION, apply unless otherwise authorized by the Service Area Director of Air Traffic Operations.

NOTE-
Unless otherwise authorized, tower radar displays are intended to be an aid to local controllers in meeting their responsibilities to the aircraft operating on the runways or within the surface area. They are not intended to provide radar benefits to pilots except for those accrued through a more efficient and effective local control position. In addition, local controllers at nonapproach control towers must devote the majority of their time to visually scanning the runways and local area; an assurance of continued positive radar identification could place distracting and operationally inefficient requirements upon the local controller. Therefore, since the requirements of paragraph 5-3-1, Application, cannot be assured, the radar functions prescribed above are not considered to be radar services and pilots should not be advised of being in "radar contact."

3-1-12. VISUALLY SCANNING RUNWAYS

a. Local controllers must visually scan runways to the maximum extent possible.

b. Ground control must assist local control in visually scanning runways, especiallywhen runways are in close proximity to other movement areas.

3-7-2. TAXI AND GROUND MOVEMENT OPERATIONS

Issue the route for the aircraft/vehicle to follow on the movement area in concise and easy to understand terms. The taxi clearance/route must include the specific route to follow. When a taxi clearance to a runway is issued to an aircraft, confirm the aircraft has the correct runway assignment.

i. Issue progressive taxi/ground movement instructions when:

1. A pilot/operator requests.

2. The specialist deems it necessary due to traffic or field conditions, e.g., construction or closed taxiways.

3. Necessary during reduced visibility, especially when the taxi route is not visible from the tower.

NOTE:
Progressive instructions may include step-by-step directions and/or directional turns.

REFERENCE-
FAA Order JO 7110.65, Para 3-7-4, Runway Proximity.
FAA Order JO 7110.65, Para 3-11-1, taxi and Ground Movement Operation.

3-10-7. LANDING CLEARANCE WITHOUT VISUAL OBSERVATION

When an arriving aircraft reports at a position where he/she should be seen but has not been visually observed, advise the aircraft as a part of the landing clearance that it is not in sight and restate the landing runway.

PHRASEOLOGY-
NOT IN SIGHT, RUNWAY (number) CLEARED TO LAND.

NOTE:
Aircraft observance on the CTRD satisfies the visually observed requirements.

3-10-5. LANDING CLEARANCE

a. When issuing a clearance to land, first state the runway number followed by the landing clearance. If the landing runway is changed, controllers must preface the landing clearance with "Change to runway" followed by the runway number. Controllers must then restate the runway number followed by the landing clearance.

PHRASEOLOGY-

RUNWAY (number) CLEARED TO LAND.

Or

CHANGE TO RUNWAY (number, RUNWAY (number) CLEARED TO LAND.

NOTE-

The purpose of the "change to runway" phraseology and restating the runway number is to emphasize to the pilot that they are being cleared to land on a runway other than what they were expecting.

b. When you become aware that an aircraft is aligned with the wrong surface, inform the pilot and:

1. Issue control instructions/clearances., or

EXAMPLE-
" United four twenty three, go-around, you appear to be aligned with the wrong runway."
"American sixty three, go-around, you appear to be aligned with a taxiway."
"Southwest two thirty nine, you appear to be aligned with Runway 27 Left (pertinent information), Runway 27 Left, cleared to land. "

2. If time permits, verify the pilot is aligned with the correct runway. Issue control instructions/clearances as necessary.

EXAMPLE-
"Twin Cessna four one four lima bravo, verify you are aligned with Runway 27 Left."

Section 9. Radar Arrivals

5-9-2. FINAL APPROACH COURSE INTERCEPTION

a. Assign headings that will permit final approach course interception on a track that does not exceed the interception angles specified in TBL 5-9-1.

b. If deviations from the final approach course are observed after initial course interception, apply the following:

1. Outside the approach gate: apply procedures in accordance with subparagraph a, if necessary, vector the aircraft for another approach.

2. Inside the approach gate: inform the pilot of the aircraft's position and ask intentions.

PHRASEOLOGY-
(Ident) (distance) MILE(S) FROM THE AIRPORT, (distance) MILE(S) RIGHT/LEFT OF COURSE, SAY INTENTIONS.

GO AROUND- Instructions for a pilot to abandon his/her approach to landing. Additional instructions may follow. Unless otherwise advised by ATC, a VFR aircraft or an aircraft conducting visual approach should overfly the runway while climbing to traffic pattern altitude and enter the traffic pattern via the crosswind leg. A pilot on an IFR flight plan making an instrument approach should execute the published missed approach procedure or proceed as instructed by ATC; e.g., "Go around" (additional instructions if required).

TOWER CAB OBSCURED WITH CONDENSATION

AT THE FIRST SIGNS OF CONDENSATION ON THE WINDOWS IF THE TOWER CIC BELIEVES IT WILL IMPEDE ATC OPERATIONS, GO INTO AN ATC ALERT STATUS AND:

1) ADVISE THE TRACON OS/CIC **"TOWER WINDOWS OBSCURED WITH CONDENSATION."**

THIS NOTIFICATION MEANS:

a. TOWER CAN NO LONGER PROVIDE VISUAL

b. MORE SPACING IS NEEDED BETWEEN ARRIVALS TO ALLOW FOR POSITION REPORTS.

2) IF TOWER LOSES VISUAL CONTACT WITH RUNWAYS AND TAXIWAYS AND THEREFORE CANNOT SCAN THE RUNWAYS AND/OR DETERMINE AIRCRAFT POSITION IAW JO 7110.65 3-1-12 VISUALLY SCANNING RUNWAYS AND/OR 3-1-7 POSITION DETERMINATION OPERATIONS DO THE FOLLOWING:

AIRCRAFT IN THE AIR

a. USE TOWER RADAR DISPLAYS IAW JO 7110.65 3-1-9 AND 5-9-2 TO DETERMINE AIRCRAFTS EXACT LOCATION TO ENSURE CORRECT ALIGNMENT WITH ASSIGNED LANDING RUNWAY.

b. UPON LANDING GET POSITION REPORTS FROM PILOTS TO ENSURE WHEN RUNWAY IS CLEAR.

AIRCRAFT ON THE GROUND

c. GET POSITION REPORTS FROM AIRCRAFT, PERSONNEL AND VEHICLES BEFORE ISSUING TAXI INSTRUCTIONS, TAKEOFF CLEARANCE OR WHEN AUTHORIZING VEHICLES OR PERSONNEL ONTO THE MOVEMENT AREA IAW JO 7110.65 3-1-7 NOTE.

d. ISSUE PROGRESSIVE INSTRUCTIONS IAW JO 7110.65 3-7-2 I IF NEEDED.

e. GET POSITION REPORTS WHEN AIRCRAFT, VEHICLES OR PERSONNEL ARE CLEAR OF THE MOVEMENT AREA.

3) SELECT BOX ON DATIS: "TOWER WINDOWS OBSCURED"

4) OS/CIC MAKE LOG ENTRY IN THE DAILY LOG 7230-4. "TOWER WINDOWS OBSCURED WITH CONDENSATION."

5) DURING NORMAL BUSINESS HOURS CALL TAA MAINTENANCE AT: **918-838-5082**
AFTER HOURS CALL OPS DISPATCH AT: **918-838-5030**

6) Non Admin Hours Call ATM: **JOSH ROGERS: 361-947-6703**

If no answer call: Primary Contact: **MARC GALESKI:** Office **913-254-8402** / Wk cell **816-266-9421** / Hm cell **913-620-5177**

If no answer call: Secondary Contact: **DANIEL NEEDHAM:** Office **913-254-8401/** WK Cell: **816-400-5823/** Hm cell: **913-731-4117**

If no answer call: **ROC: 817-222-5006**

Condition Assessment and 6480.17 Facility Evaluation & Life Cycle Assessment

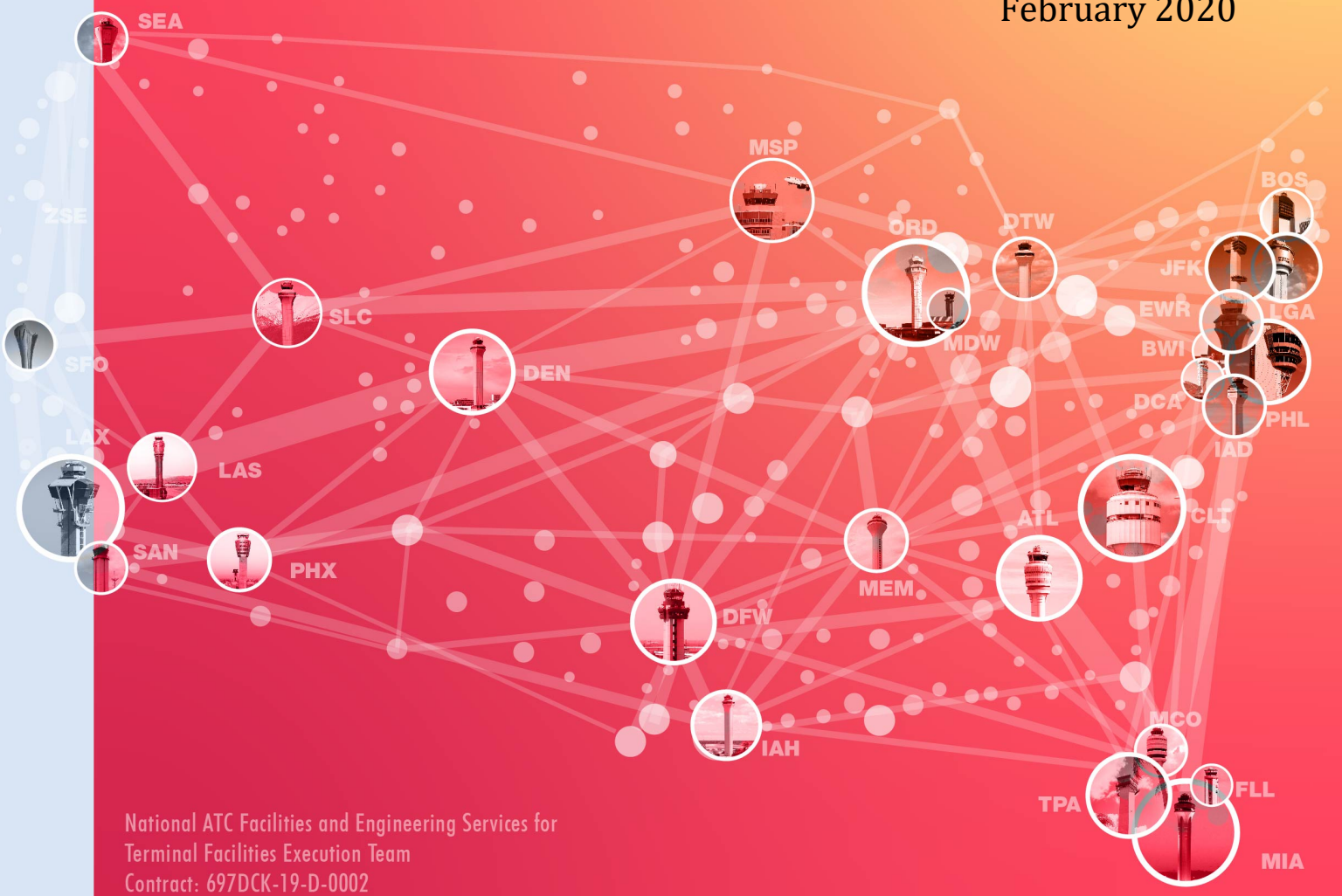
Task Order 0015

Life Cycle Assessment Report

TUL ATCT and Base Building

Tulsa, OK

February 2020



National ATC Facilities and Engineering Services for
Terminal Facilities Execution Team
Contract: 697DCK-19-D-0002

Jacobs

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1100 N. Glebe Road, Suite 500
Arlington, Virginia 22201
Phone: 1.571.218.1000 Fax: 1.571.218.1600

February 19, 2020

U.S. Department of Transportation
Federal Aviation Administration
800 Independence Ave, SW – 7th Floor
Washington, D.C. 20597

Attention: Zane Edwards, Terminal Facilities - AJW-244

Subject: TUL ATCT and Base Building: Tulsa, Oklahoma Reports Submittal

Reference: Contract No. NO. DTFAWA-10-D-00021 (E-2)
Jacobs Job No. FCWC5915-TUL

Dear Mr. Edwards,

One copy each of both the Life Cycle Report and the Condition Assessment & 6480.17 Facility Evaluation Report for the TUL ATCT and Base Building at the Tulsa International Airport in Tulsa, Oklahoma have been delivered to the Tulsa SSC Manager. The SSC Manager is also getting one formatted thumb drive containing both reports. The Air Traffic Manager at the TUL ATCT facility is also getting a hard copy of each of the reports. Additionally, one formatted CD containing both reports is being delivered to FAA Headquarters.

Please see the memorandum on the following page for additional explanation regarding the contents of the reports provided for the above-referenced facility; as well as the location of the electronic copy of the reports on Terminal Facility's KSN site.

If you have any questions, please contact me at 571-218-1316.

Very truly yours,

Jacobs Buildings, Infrastructure & Advanced Facilities

[redacted]

James A. Fiedorek, P.E.
Project Manager

Federal Aviation Administration

Memorandum

OCT 21 2010

Date:

To: ATCT/TRACON Facility Managers

From: [redacted]

Subject: Facility Condition Assessments, Life Cycle Assessments and Maintenance and Repairs Standards Model Reports

Enclosed are copies of your facility's most recent Condition Assessment Report and/or Lifecycle Sustainment Plan.

The Condition Assement/6480.17 Facility Evaluation Report includes a review of all the facility's architectural and engineering systems. The report also includes an evaluation of architectural/life safety and ADA/ABA accessibility, lightning protection, grounding, bonding and shielding (LPGBS) and mechanical and electrical systems.

The Life Cycle Assessment and Maintenance and Repair Standards (MARS) Model report was performed in conjunction with your facility assessment. It includes an inventory of the existing systems and maintainable operational equipment and an aged based condition assessment analysis to provide a maintenance and repair (M&R) list; provide suggested projects (Repair and Renewal) over the next 20 years; and generates an M&R deferred maintenance summary. This report will help you to (a) establish budget requirements for facility maintenance and repair, (b) identify "Deferred Maintenance" items that can be incorporated into projects and (c) assist in planning ahead for major upcoming facility repair or replacement requirements.

Electronic copies of both reports are located on the Terminal Facilities KSN site at ***https://ksn2.faa.gov/ajt/programops/Facilities/improvement_program/reports/default.aspx.*** Additionally, Terminal Facilities maintains a CD ROM copy.

If you have any questions about your report, please do not hesitate to contact Arthur Glover (202) 534-4701 or Sol Tillett (202) 385-8698.

LIFE CYCLE ASSESSMENT REPORT

THE ATCT AND BASE BUILDING AT TULSA INTERNATIONAL AIRPORT

TULSA, OKLAHOMA

(TUL)



FEBRUARY 2020

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2.	INTRODUCTION & FACILITY DESCRIPTION	6
3.	METHODOLOGY - PROCESS DESCRIPTION	15
4.	RESULTS & ANALYSIS	18
5.	FORECASTED SUSTAINMENT PROJECTS	24

SECTION 2: Standard Life Cycle Reports

1 Life Cycle Reports - Facility
- Facility Plant Replacement Value (PRV) Worksheet
- Facility Summary
- Facility Average M&R Costs
- Facility Most Costly M&R Tasks
- Facility Yearly Cost Profile Chart
- Facility Building List
- Facility Deferred Maintenance Detail
- Facility Deferred by System Chart
- Facility M&R Costs by System Over 20 Years
- Facility M&R Costs by Task Over 30 Years

2 Life Cycle Building Reports - ATCT
- Average M&R Costs
- Most Costly M&R Tasks
- Yearly M&R Cost Profile Chart
- Building Extended Component List with Remaining Service Life
- Deferred Maintenance Detail
- M&R Costs by System over 20 Years
- M&R Costs by Task over 30 Years

3 Life Cycle Building Reports - Base Building
- Average M&R Costs
- Most Costly M&R Tasks
- Yearly M&R Cost Profile Chart
- Building Extended Component List with Remaining Service Life
- Deferred Maintenance Detail
- M&R Costs by System over 20 Years
- M&R Costs by Task over 30 Years

4 Life Cycle Building Reports – E/G Building
Average M&R Costs
Most Costly M&R Tasks
Yearly M&R Cost Profile Chart
Building Extended Component List with Remaining Service Life
Deferred Maintenance Detail
M&R Costs by System over 20 Years
M&R Costs by Task over 30 Years

SECTION 3: Appendices

A Site Photographs
B Glossary of Terms
C Summary of Standard Reports
D Forecasted Sustainment Projects
E CA ROM Construction Estimates – ATCT, Base Building, and E/G Building
F CA Mechanical and Electrical Equipment List

1. EXECUTIVE SUMMARY

This report is a Life Cycle Facility Maintenance and Repair cost forecast report for the Airport Traffic Control Tower (ATCT) and Base Building (with TRACON) at the Tulsa International Airport in Tulsa, Oklahoma.

The report provides estimated Deferred Maintenance (DM), the Facility Condition Index (FCI), and forecasted maintenance and repair (M&R) funding requirements. This report is based on data collected during a site survey conducted by Jacobs on November 20 and 21, 2019.

Deferred Maintenance (DM) Costs

1.1. Deferred Maintenance is the cost to repair or replace existing building components based upon their age or condition. The facility's total Deferred Maintenance is:

$1,926,308

A separate Condition Assessment (CA) evaluation report was performed for this facility. The CA report generated a rough order of magnitude (ROM) cost related to modernization and upgrade of the facility to current codes and standards of $2,684,764. When the applicable portion of the CA ROM cost is added to the DM, the overall requirement is:

$1,926,308+$2,684,764=$4,611,072

Facility Condition Index (FCI)

1.2. The Facility Condition Index is a general indicator of facility condition based on the ratio of DM to plant replacement value (PRV). The greater the FCI the better overall facility condition. The greater the FCI the better overall facility condition. The FCI for the facility is in need of attention and corrective action should be taken to reduce the deferred maintenance.

$$FCI = \left(1 - \frac{DM}{PRV}\right) \times 100\ \%$$

FCI without CA ROM = 82.7%

FCI including CA ROM = 58.5%

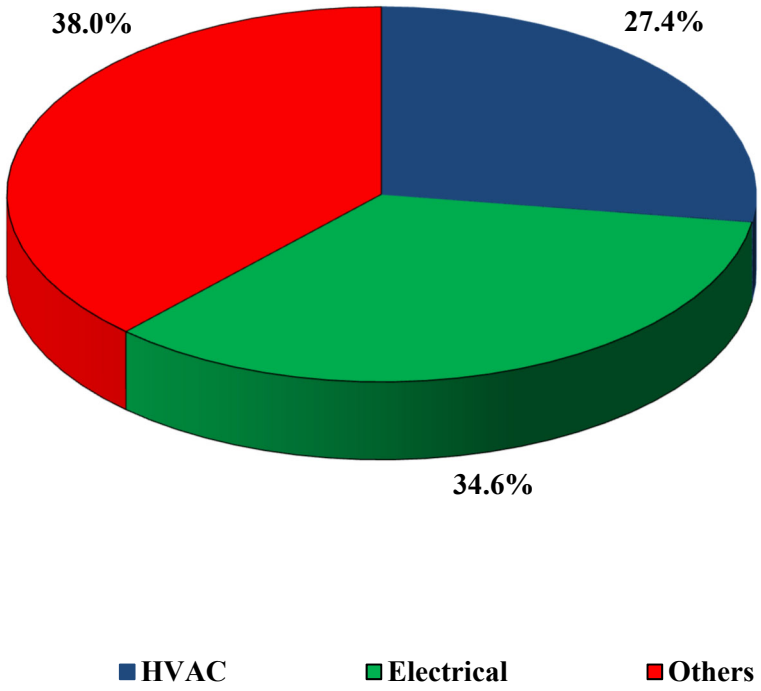
Maintenance & Repair (M&R) Costs

1.3. The 30 year average forecasted annual maintenance and repair (M&R) requirements for the facility include:

30-year Average Annual M&R Costs	
Preventive Maintenance:	$ 64,424
Unscheduled Maintenance:	$ 79,494
Repair:	$ 33,646
Replacement:	$144,312
Total:	**$321,875**

The most costly building systems to maintain over the next 20 years are HVAC and Electrical accounting for 62.0% of the total forecasted M&R cost. The "Others" category shown in Figure 1.3 includes; Roofing, Exterior Enclosure, Interior Finishes, Conveying, Plumbing, Kitchen, Equipment, Site Improvements and all other building systems.

Figure 1.3. Average Annual M&R Costs by System over 20 years



2. INTRODUCTION & FACILITY DESCRIPTION

Life cycle forecasting is a method for determining facility maintenance and repair costs that is accepted by the Federal Government. The FAA has adopted this approach to assist in budgeting sustainment funds for Terminal facilities.

Purpose

The goals of the report are threefold:

- Establish budget requirements for facility maintenance and repair.
- Identify Deferred Maintenance items that can be incorporated into projects.
- Help the FAA plan ahead for major upcoming facility repair or replacement requirements.

Facility Overview

The ATCT, with approximately 7,860 gross square feet (GSF), including a 400 SF Cab in floor area, was constructed in 1958. The ATCT is a non-standard type design. The Cab floor elevation is 145'-5 ½" above the ATCT First Floor finished floor elevation.

The single-story Base Building and Link, to the north of the ATCT, houses the TRACON and NAS equipment room for the facility as well as administrative space. The Original 3,960 square foot Base Building and Link were constructed in 1958 at the same time as the ATCT. A 6,100 SF addition to the Base Building was constructed in the early 1970s. A date of 1972 will be used for all components of the Base Building Addition that are building original. Thus, the approximate gross area of the Base Building and Link is 10,060 square feet.

The 800 SF stand-alone single-story E/G Building, to the west of the Base Building, houses the facility's essential and critical power distribution system main components (engine generator and UPS). A date of 1988 will be used for all building components original to the E/G Building construction.

The buildings on the site, and the site itself, are owned and maintained by the Tulsa Airport Authority, except for the essential and critical power distribution system which is owned and maintained by the FAA.

ATCT Description

2.1. The ATCT is a Level 8, Tier 3 Air Traffic activity facility. It is ten stories excluding the control Cab and Basement.

ATCT Architectural Description

The ATCT is constructed with a structural steel superstructure. Steel floor beams support a concrete atop metal deck floor system for elevated floors in the ATCT.

The exterior walls for the lower portion of the ATCT shaft are constructed with nominal 4" wide face brick backed by a nominal 6" CMU walls. The steel columns and beams at each floor level are exposed for the lower shaft levels with the brick façade infilled between the steel members. All the upper levels of the shaft (Seventh Floor to Tenth Floor), the south portion of the floor-plate that on lower levels is open structural framing only, becomes enclosed with 4" thick precast concrete panels backed by nominal 6" CMU walls.

The ATCT shaft contains vertical circulation items on the north side of the floor-plate. The vertical circulation items are the ATCT Stair, Basement Stair, Cab Stair, Elevator and a Cable Chase.

Interior finishes for the ATCT walls are painted CMU, concrete, gypsum wallboard and FRP (fiberglass reinforced plastic). Floor finishes include carpet, painted concrete, or vinyl composite tile (VCT). Ceilings are gypsum wallboard or exposed structure.

The Cab exterior wall below the Cab windows is a vertical wall with insulated metal panels. The Cab windows are non-insulating glass in pipe mullions. The Cab interior floor and ceiling finishes are carpet flooring and black acoustic tile ceiling. The roof of the Cab it is assumed to be modified bitumen roofing system with a white elastomeric paint atop it.

The 660 SF Catwalk encircles the Cab and is accessed via a door on the north side of the Cab base wall. The roof of the Catwalk is like the Cab roof; an assumed modified bitumen roofing system that has had a white elastomeric paint applied atop it.

Table 2.1 displays how space in the ATCT is utilized.

Table 2.1 Space Utilization in the ATCT

ATCT Level	Utilization
Cab	Control Cab
Tenth Floor	Cab Stair, Cable Chase, and Junction Room
Ninth Floor	ATCT Stair, Cable Chase, Break Room, Unisex Restroom, Workout Room, Smoking Room, and Kitchen
Eight Floor	ATCT Stair, Cable Chase, and Electronics Equipment Room
Seventh Floor	ATCT stair, Cable Chase, Vestibule, Mechanical Equipment Room, Electronics Equipment Room, and Former Chiller Room
First Floor thru Sixth Floor	ATCT Stair, and Cable Chase
Basement Level	Basement Stair, Elevator Machine Room, Storage Room, Mechanical Equipment Room, and Cable Chase

ATCT Mechanical System Description

Chilled Water System

Chilled water is supplied to the ATCT by an air-cooled scroll chiller TCH-1. The chiller is located on grade to the east of the ATCT. Chilled Water Pump P-T1C, located in the Basement Level Mechanical Equipment Room, circulates the water to the various air handling units in the ATCT. It is believed the chiller is controlled by an integrated controller via the DDC System.

Heating Water System

Heating water is supplied to the ATCT by two natural gas-fired low-pressure hot water boilers B-T1 and B-T2, located in the Basement Mechanical Equipment Room. Hot water is circulated through the boilers by Heating Water Pump P-T1 and is circulated to the various air handling units in the ATCT by Heating Water Pumps P-T2 and P-T3. The boilers are controlled by the DDC System and the

pumps by the legacy pneumatic system. Due to the limited documentation on site, the sequence of operations of the two boilers and pumps is unknown. The previous boiler installation (prior to 2016) had only one boiler of much higher capacity. Therefore, it is believed that the two boilers operate in a supplemental fashion depending on demand and the pumps in a primary/standby configuration. Draft Inducer Fan DF-1 is located exterior atop the boilers flue stack to promote proper exhaust from the boilers.

A heating water buffer tank, BBT-1, was recently installed in the Storage Room. This addition allows the tank to store the heating water so that it reduces the on/off cycles of the boilers. The water from the buffer tank is circulated back to the heating loops by Heating Water Pump P-T4, also located in the Storage Room. Additional equipment serving the heating water system includes: Expansion Tanks ET-T1, ET-T2, ET-T3 and Chemical Pot Feeder CPF-2, all located in the Basement except ET-T2 which is in the Seventh Floor Electronics Equipment Room.

Equipment Serving the Seventh Floor, Eighth Floor, Ninth Floor and Cab

Multizone Air Handling Unit AHU-T1 located in the Seventh Floor Mechanical Equipment Room serves all the upper levels of the ATCT, including the Cab. The unit is controlled by a combination of DDC and pneumatic controls.

The Cab is backed up by two DX Air Handling Units TAHU-1 and TAHU-2, located on the Junction Level (Tenth Floor). Their associated air-cooled condensing units TCU-1 and TCU-2 are located exterior on the Catwalk. Supply air is ducted to the shared ductwork from AHU-T1 then to window sill-mounted linear diffusers. Return air is ducted back from the Cab Stair to the AHUs. The two backup units (TAHU-1 and TAHU-2) have a cooling capacity of 3 tons each. Assuming the units can operate in tandem, that gives a combined total cooling capacity of only 6 tons, which is well undersized for peak demand. As a result, the Cab is not provided with 100% cooling redundancy.

Window-type Air Conditioning Units AC-1 and AC-2, provide supplemental conditioning (to the main unit AHU-T1) for the Break Room on the Ninth Floor, and Electronic Equipment Room on the Eighth Floor, respectively. Each unit is controlled by an integrated thermostat.

Window-type Air Conditioning Unit AC-3 provides supplemental conditioning (to the main AHU-T1) for the Electronic Equipment Room on the Seventh Floor. The unit is controlled by push buttons on the unit.

Rooftop Emergency Exhaust Fan EF-T1, located on the Cab roof, provides ventilation for the Cab. The unit is controlled a wall-mounted switch in the Cab.

Ceiling-mounted Exhaust Fan EF-T2 ventilates Unisex Restroom. The unit is controlled by a motion detecting switch located on the ceiling of the room.

Equipment Serving the Basement, First Floor and Link

Air Handling Unit AHU-T2, located in the Basement Mechanical Equipment Room, provides conditioning for the First Floor of the ATCT and the Link. Supply air is ducted to the Link and the return air is ducted back to the unit via the

Basement's stairwell-mounted return air grille. A wall-mounted pneumatic thermostat near the return air grille controls the temperature in the Link.

Air Handling Unit AHU-T3, located in the Basement Mechanical Equipment Room, provides conditioning the for the Elevator Machine Room. The temperature in the Elevator Machine Room is controlled by a wall-mounted pneumatic thermostat.

Air Compressor AC-2 and Air Dryer AD-2, located in the Basement Mechanical Room, provides compressed air for the pneumatic controls throughout the ATCT.

Base Building Description

2.2 The single-story Base Building was constructed in two different eras. The Original Base Building (and 70-GSF Link) was constructed with the ATCT in the late 1950s. The approximate area of the Original Base Building and Link was 3,960 GSF.

A large addition was constructed to the north and east of the Original Base Building in the early 1970s. The L-shaped addition fully wraps the north face of the Original Base Building and extends to the east of the Original Base Building. The Base Building Addition partially wraps the east face of the Original Base Building. The approximate gross area for the Base Building Addition is 6,100 square feet. The overall area for all eras of Base Building construction, including the Link, is approximately 10,060 GSF.

Base Building Architectural Description

The original design drawings for the Original Base Building were not found during the site survey, so the exact nature of the exterior walls for that era of construction are unknown.

The exterior walls for the 1972 Addition are constructed with nominal 4" wide face brick backed by nominal 6" CMU wall. Between the brick and CMU there is an air cavity that is 2 ¾" thick. The face brick extends 8" below the concrete slab-on-grade with the CMU back-up sitting atop the slab-on-grade. It is believed the Original Base Building walls are constructed similar to the 1972 Addition.

The Link's exterior wall construction consists of an aluminum and glass storefront system with 1" thick insulating glass.

Typical interior wall finishes are painted gypsum wallboard or painted CMU. Floor finishes are vinyl composite tile, ceramic tiles, or carpet. Ceilings are acoustical tiles or no exposed ceiling.

The roof of the Base Building and Link uses a white TPO membrane roofing system that was installed in 2016. The membrane roof is atop the concrete slab used for the roof structure over both the Original Base Building and the 1972 Addition. The substrate below the TPO membrane is unknown.

Table 2.2.1 displays how space in the Base Building is utilized.

Table 2.2.1 Space Utilization in the Base Building

Room Name	
Link	Electrical Closet
Vestibule	Mechanical Equipment Room
Corridors	Unisex Restroom
AT Reception	Mechanical Equipment Rooms
AT Storage	TRACON
ATM Office	Operations Supervisor Office
Conference/Training Room	ETG Lab
Support Specialist Office	Tech Ops Ready Room
Staff Office and Training	NATCA Office
Storage	Training/Debrief and CBI
Tech Ops Office	Telco Room
Contract Weather Office	Sign-in Room
Kitchen	Smoking Room
Break Room	Storage
Lounge	Women's Restroom
Locker Room	Men's Restroom

Base Building Mechanical Description

Heating Water System

Heating water is supplied to the Base Building by a natural gas-fired low-pressure hot water boiler B-1, located in the Mechanical Equipment Room. Hot water is circulated throughout the heating coils by Heating Water Pumps P-1 and P-2. The boiler is controlled by the DDC system and is interlocked with a carbon monoxide sensor. Additionally, the Mechanical Equipment Room, in which the boiler is located, is provided with a Supply Air Fan SF-2, located at the point of entry of the combustion air. Additional equipment serving the heating water system includes: Expansion Tank ET-1 and Chemical Pot Feeder CPF-1.

Major Air Distribution Equipment

Multizone Air Handling Unit AHU-5, located in the Mechanical Equipment Room, serves the Original Base Building. AHU-5's associated air-cooled Condensing Unit CU-5 is located outside the Base Building on the east side. Each zone is controlled by individual thermostats. AHU-5 serves four separate zones via internal control dampers. Supply air from AHU-5 is distributed via above-ceiling supply ductwork to ceiling-mounted diffusers. The zones are as follows:

Area Served by AHU-5		
Zone 1	Staff Manager Office	Storage Room
Zone 2	Tech OPS Office	
Zone 3	Corridor (original section)	
Zone 4	Electronics Equipment Room	

Air Handling Unit AHU-4, located in the Mechanical Equipment Room, serves the offices at the north side of the Base Building and the above ceiling supply in the TRACON Room. The cooled air is ducted to eight hot water reheat boxes (RC-1 thru RC-8) located in the ductwork serving the specific zones. The reheat is controlled by wall-mounted thermostats. AHU-4's associated air-cooled condensing unit CU-4 is located on the roof.

Downflow Computer Room Air Conditioning Units CRU-1 and CRU-2 serve the TRACON Room. CRU-1 is in the Mechanical Equipment Room to the north of the TRACON Room, while CRU-2 is in in the Corridor to the south of the TRACON Room. One unit is primary while the other is standby. The units provide conditioned air under the raised access floor. Air is distributed through raised floor-mounted diffusers. Return air is ducted back to units via the ceiling plenum and transfer air ducts. Conditioned ventilation outside air is ducted to the TRACON Room from Air Handling Unit AHU-4. The computer room units associated air-cooled condensing units, ACC-1 and ACC-2, are located on the roof of the Base Building. The units are controlled by individual thermostats that are connected to an auto-changeover controller. The auto-changed controller changes the primary and standby responsivities.

Downflow Computer Room Air Conditioning Units CRU-3 and CRU-4 are in and serve the Electronics Equipment Room. One unit is primary while the other is standby. The units provide conditioned air under the raised access floor. Air is distributed through raised floor-mounted diffusers and is directly connected to various electronics equipment. Return air is directly drawn back into the top of the units. The cooling is augmented for the Electronic Equipment Room with conditioned air ducted from Air Handling Unit AHU-5. Associated air-cooled Condensing Units ACC-3 and ACC-4 are located on the roof of the Base Building. The units are controlled by individual thermostats that are connected to an auto-changeover controller. The auto-changeover controller changes the primary and standby responsivities.

Air Handling Units AHU-1 and AHU-2 are in and serve Telco Room. One unit is primary while the other in standby. The conditioned air is ducted to ceiling diffusers and is returned to the units via return air grilles and ductwork. Associated air-cooled Condensing Units CU-1 and CU-2 are located outside the Telco Room on the south side of the Base Building at grade on concrete pads. A wall-mounted thermostat controls the temperature via the DDC system.

Residential type Ceiling Fans CLF-2 and CLF-3 provide air circulation for the TRACON Room.

Wall-mounted propeller Exhaust Fan EF-1 ventilates the Smoking Room. It is controlled by a wall-mounted timer switch.

Roof-mounted Exhaust Fan EF-2 ventilates Men's and Women's Restrooms. The fan is assumed to run continuously.

Roof-mounted Exhaust Fan EF-3 ventilates the Unisex Restroom. The fan is assumed to run continuously.

Air compressor AC-1 and Air Dryer AD-1, located in the Mechanical Equipment Room, provides compressed air for the pneumatic controls in the Base Building.

E/G Building Description

2.3. The one-story stand-alone E/G Building, with an approximate area of 800 GSF, was constructed in 1988; much after the ATCT and Original Base Building and after the 1972 Base Building Addition.

E/G Building Description

The exterior walls for the E/G Building are constructed with masonry bearing walls consisting of nominal 4" brick on the outside face of the wall backed by nominal 8" CMU on the inside face of the wall. The walls are 1'-2" thick with 1 ½" rigid insulation provided in the cavity between the face brick and CMU.

The E/G Building's roof is a white TPO membrane type roof (same roofing membrane as used for the Base Building). The building's original roof was a built-up asphalt roof with 1 ½" of rigid insulation below.

The E/G Building contains three rooms. The largest room, the E/G Room is at the north end of the building. To the south of the E/G Room is the UPS Room with the smallest room the Battery Room at the south end of the building. Room finishes in the E/G Building include painted concrete floors, painted CMU walls (the exterior walls in the conditioned UPS Room have gypsum wallboard on furring strips to the inside of the CMU) and no ceiling.

E/G Building Mechanical Description

The UPS Room is cooled by Rooftop Air Conditioning Unit RTU-1 and Air Handling Unit AHU-3. One unit is primary while the other in standby. RTU-1's temperature is controlled by a wall-mounted thermostat. AHU-3 is a horizontally-mounted DX cooling air handling unit, which is suspended above the UPS equipment in the room. AHU-3's associated air-cooled Condensing Unit CU-3 is located adjacent to the E/G Building on its east side at grade. A wall-mounted thermostat controls the operation of AHU-3. The primary and standby responsibilities are changed directly at each unit's thermostat by setting a 4° temperature difference between their controlling thermostats.

Air is transferred from UPS Room to the Battery Room by Transfer Air Fan TF-1, located in the separating CMU wall. The fan is controlled by a wall-mounted speed controller.

Propeller Exhaust Fan EF-2 provides ventilation for the Engine Generator Room. The fan is interlocked with the operations of the engine generator.

Electric Unit Heaters EUH-1 and EUH-2 provide heat for the Battery Room and Engine Generator Room, respectively. Each fan is controlled by a wall-mounted thermostat.

Above grade Fuel Storage Tank FT-1, located to the north of the E/G Building, serves the engine generator. The fuel is piped above ground to Day Tank DT-1, located in the Engine Generator Room. Fuel Level Monitor FLM-1, located in the Engine Generator Room, provides leak and level monitoring of FT-1.

Facility-wide Fire Detection/Protection Systems

Fire and life safety systems serving the facility include fire detectors, pull-stations and notification appliances located throughout, a stair pressurization system in the ATCT, two fire alarm annunciator panels and a main fire alarm panel in the ATCT. The facility does not have a sprinkler system, nor does the ATCT have a dry standpipe. Fire protection coverage of the facility is provided by fire extinguishers only. A detailed list of specific fire and life safety systems serving the facility is provided in the narrative below.

ATCT

Fire Alarm Annunciator Panel FAAP-1 is in the Cab.

The ATCT Stair and Link are pressurized by propeller-type Stairwell Pressurization Fan SF-1, located at the Second Floor in the ATCT Stair on its north exterior wall. Air is drawn in from a louver on the south exterior wall façade and relieved from the stairwell via a louver on the south exterior wall at the Fifth Floor. The fan's operations are controlled by the fire alarm system.

Kitchen Fire Suppression System KFS-1 is mounted above the range hood in the Break Room to protect from accidental cooking fires.

Fire Alarm Control Panel FACP-1 is in the ATCT Stair on the First Floor of the ATCT.

Base Building

Fire Alarm Annunciator Panel FAAP-2 is in the TRACON Room

Overall Facility Electrical Description

The ATCT and Base Building were originally constructed in the late 1950s. A large addition to the Base Building was added in the early 1970s. The Engine Generator Building was constructed in the late 80s. The Airport-owned, building service panelboards mostly date back to the facility's original construction eras. Some of the FAA-owned critical and essential panelboards date back to the original construction; however, most were added or replaced in renovations in 1988, 1994 and 2004. The engine generator (E/G), the automatic transfer switch (ATS) and uninterruptable power supply (UPS) were most recently replaced during a 2004 renovation. The electronics grounding system was also most recently upgraded in 2004 during the STARS equipment installation. The Lightning Protection System (LPS) for each building appears to have received modifications, but no clearly defined major project was identified. The lighting system for the ATCT and Base Buildings is quite dated with some isolated upgrades to the original lighting system assumed for both, but no clearly defined major changes to the lights throughout the facility. Some T-12 fluorescent fixtures have been re-lamped with LED replacement lamps; however, these lamps do not meet FCC Title 47 Part 15 Class B radiation limits and are therefore not allowed to be used in FAA facilities.

The power distribution system modes of operation at the facility are Building Service, Essential Service and Critical Service.

Under the Building Service mode, power is supplied to the facility by Oklahoma Gas & Electric (OG&E) via a 500 kVA, 480Y/277 volt secondary, Utility-owned transformer. The Utility transformer feeds Main Building Service Distribution Switchboard MDPNH, which provides power to all loads in the facility.

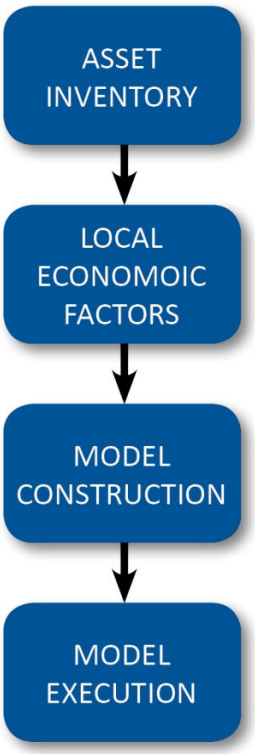
Under the Essential Service mode, power is supplied by a 375 kVA/300 kW, 480Y/277 volt, 3 phase, 4 wire diesel engine generator (E/G). The E/G feeds Main Essential Distribution Switchboard MDPEH via the alternate input of the 600 ampere Automatic Transfer Switch (ATS). From Main Essential Distribution Switchboard MDPEH, power is distributed to all essential loads in the facility.

Under the Critical Service mode, power is supplied by a 100 kVA, 208Y/120 volt, 3 phase, 4 wire uninterruptible power supply (UPS), which feeds Panelboard MDPC via a 400 ampere UPS Maintenance Bypass Panel and Panelboard UPS-1. From Panelboard MDPC, uninterruptible power is distributed to all critical NAS equipment loads in the facility.

3. METHODOLOGY - PROCESS DESCRIPTION

Life Cycle Analysis Process

3.1. The analysis and documentation process consist of data collection via survey of the facility, applying technical and economic modifiers to the data, and generating life cycle reports utilizing the CostLab – a software tool developed and supported by CBRE/Business Analytics.



3.1.1. Asset Inventory. An on-site facility asset survey and record drawing review were performed to identify, evaluate, and inventory each facility component. Facility construction dates, costs and replacement values were also determined. As each component was surveyed, its condition was evaluated and a remaining service life determined. Photographs were taken of the facility in general, and of specific deficiencies noted during the survey. *Appendix A, Site Photographs* provides photographs and descriptions.

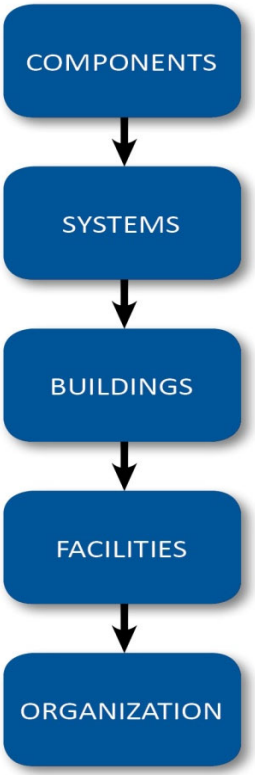
Local Economic Factors. The Life Cycle model considers local economic cost factors. CBRE | Business Analytics has developed cost factors for over 400 metropolitan areas including Tulsa, Oklahoma that was used in this report.

3.1.2. Model Construction. A component by component software model of the facility was developed by selecting components from a standard CostLab building component list that were equal or similar to the components identified in the field survey. Minor differences between the standard CostLab components and the field survey were addressed through notes on the CostLab building component list. When the standard CostLab building component, list did not reasonably match a component in the site survey inventory, a new component was created and added to the CostLab list.

Model development includes field measurements, analysis of record documents, and evaluation of building component remaining service life by various means. A detailed explanation of this methodology can be found under "Calculation Methodology (Life Cycle)" in *Appendix B*, *Glossary of Terms*.

3.1.3. Model Execution. The site-specific Life Cycle model was run, analyzed, quality checked, and finalized. Except for the "Facility Plant Replacement Value (PRV) Worksheet" under Tab 1, all the reports in Tabs 1, 2, 3, and 4, are output generated by the CostLab model.

CostLab Software



3.2. CostLab is an inventory-based computer model program which forecasts long-term facility maintenance and repair costs for preventive maintenance, recurring repair, major repair, replacement, unscheduled maintenance, and deferred maintenance (DM). The model takes into consideration regional costs and climate, age or condition, and calculates a repair and replacement cost for facility components that have exceeded their predicted service life. The software is pre-loaded with applicable life cycles and costs unique to the facility being modeled.

The model results are generated by aggregating facility cost data in steps. First, specific maintenance repair and replacement tasks are computed for each component. Next, the cost data for each component is grouped by UNIFORMAT II building system. Building systems are then aggregated to form a Building total. Facility cost reports and summaries are developed by rolling up each of the associated costs for each Building in the Facility. Finally, the results of multiple facilities can be consolidated into an Organizational Roll-up. This data-model hierarchy permits analysis of specific report results by descending to the necessary level to find the basis of the report result.

The CostLab software includes the following features:

- Database forecast engine, capable of generating up to 30 year O&M requirements for virtually unlimited square footage
- Operations cost forecast module that can be configured at the task level
- Expanded component library

Appendix B, Glossary of Terms provides a glossary of Life Cycle terms. *Appendix C, Summary of Standard Reports* provides a summary of standard Life Cycle reports.

Deferred Maintenance (DM)

3.2.1. The CostLab model calculates deferred maintenance based on building components that are beyond their service life. Either actual building component installation dates, or condition-based installation (override) dates are applied to the model to calculate the DM.

In this Task Order a separate Condition Assessment (CA) Report was performed covering additional rough order of magnitude (ROM) costs related to modernization, code compliance and upgrade requirements for the facility. In order to determine the applicable portion of the CA ROM, adjustment is needed to address any items that potentially overlap with those identified in this life cycle report. Detailed explanations on the adjustment are provided in the *Results and Analysis Section* of this report. The DM including CA ROM is presented in the CostLab reports.

Facility Condition Index (FCI)

3.2.2. The FCI is calculated Deferred Maintenance divided by Plant Replacement Value (PRV), the result subtracted from 1 and shown as a percentage. Higher values indicate better overall condition. The formula used is as follows:

$$\text{FCI} = \left(1 - \frac{\text{DM}}{\text{PRV}}\right) \times 100\ \%$$

Forecasted Maintenance and Repair (M&R) Costs

3.2.3. The CostLab model generates the average forecasted annual maintenance and repair funding requirement for the facility over the next 30 years, the forecasted life cycle M&R costs by system over the next 20 years, and a year-by-year M&R cost profile for the next 30 years.

Project Builder

3.2.4. Jacobs has used the data extrapolated from the CostLab software to create individual projects including deferred maintenance and forecasted replacement tasks for the next 20 years. These tasks were analyzed and logically grouped into project packages. The complete set of these projects is included in Appendix D. A list of projects is included in the body of the report.

4. RESULTS & ANALYSIS

4.1. General Facility Findings

ATCT Findings

In general, ATCT components and systems are in need of attention and corrective action should be taken to reduce the deferred maintenance. Components requiring replacement or major overhaul include: Cab glass, Roofing, elevator, AHUs, DDC points, circuit breakers and power panelboards.

The ATCT's Deferred Maintenance consists of 80 items totaling $1,054,173, not including CA. This results in facility condition index 80.1% without CA.

Base Building Findings

In general, Base Building facility components and systems are in need of attention and corrective action should be taken to reduce the deferred maintenance. Components requiring replacement or major overhaul include: access flooring and components, AHUs, DDC points, circuit breakers and power panelboards, interior doors, security system components, acoustical ceiling tiles, resurface parking lots.

The Base Building's Deferred Maintenance consists of 111 items totaling $705,204 not including CA. The resulting Facility Condition Index is 85.2% without CA.

E/G Building Findings

In general, E/G Building facility components and systems are is in need of attention and corrective action should be taken to reduce the deferred maintenance. Components requiring replacement or major overhaul include: UP, circuit breakers and power panelboards.

The Base Building's Deferred Maintenance consists of 28 items totaling $166,931 not including CA. The resulting Facility Condition Index is 84.3% without CA.

4.2. Deferred Maintenance and Facility Condition Index

Deferred Maintenance (Age/Condition Based)

4.2.1. Deferred Maintenance (Age/Condition based). The total facility Deferred Maintenance generated by the CostLab model based on building components beyond their life cycles is **$1,926,308.**

Deferred Maintenance Including CA ROM

4.2.2. Deferred Maintenance Including Condition Assessment (CA) ROM. This DM totals **$4,611,072** including two components:

1. The cost to repair or replace existing building components based upon their age or condition.
2. The rough order of magnitude (ROM) costs related to modernization, code compliance and upgrade requirements according to the separate CA report conducted under this Task Order.

The total ROM from the CA report cannot be included without making adjustments. The CA report and this life cycle report may identify the same components as replacement or Deferred Maintenance items. To include a line item in this report for CA modernization costs as Deferred Maintenance, the "overlap" items between this and the CA report are identified as "duplicate" items with the letter "D". An adjusted CA ROM is hereby arrived by subtracting all "duplicate" items ("D") from the total CA ROM. The adjusted CA ROM is then included as a

line item in the "Facility Deferred Maintenance Detail" in the CostLab reports.

Therefore the line item in the deferred maintenance for the CA modernization and upgrades costs is derived as shown in Table 4.2.2:

Table 4.2.2 Calculation of Adjusted CA ROM

Calculation of adjusted CA ROM Line Item as DM	
Total CA ROM –Facility*	$3,754,125
Less overlap duplicates- Facility	($1,069,361)
CA ROM	$2,684,764

**The calculation above is based on the total CA ROM and total duplicates for the facility – see Appendix E.*

The "Condition Assessment ROM Estimate Schedule", of this Condition Assessment (CA) report is included in *Appendix E, ROM Construction Estimate* of this report.

Total Deferred Maintenance including adjusted CA ROM:

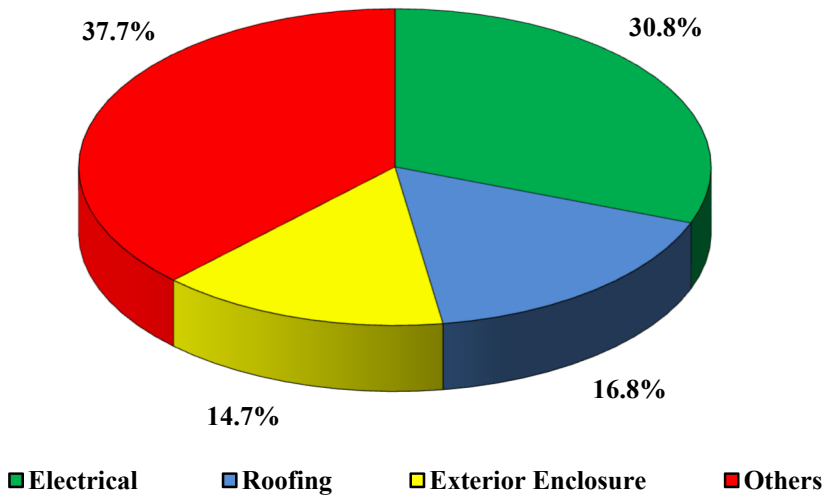
$1,926,308+$2,684,764=$4,611,072

Figure 4.2.2 displays the Facility Deferred Maintenance by system. Electrical, Roofing, and Exterior Enclosure account for 62.3% of the total deferred maintenance.

Deferred Maintenance Distribution

The "Others" category in Figure 4.2.2 includes Interior Finishes, HVAC, Conveying, Plumbing, Protection, Kitchen appliances, and site Improvements.

Figure 4.2.2 Deferred Maintenance by System



Costs Not Included in DM

Deficiencies related to codes such as Americans with Disabilities Act and Architectural Barriers Act (ADA/ABA), or mission/operational requirements are not addressed in the Deferred Maintenance.

Plant Replacement Value (PRV)

4.2.3. Plant Replacement Value (PRV). The plant replacement value is the current estimated cost to replace the facility or building as originally constructed on the same site. For the purpose of this analysis a simple and consistent approach was adopted to calculate the PRV for a given facility as a basis of comparison with other FAA terminal facilities. The PRV for TUL was determined using RS Means Cost Data and Jacobs cost experience with similar facilities. An area cost factor was applied to take into account local economic cost factors. The PRV for the overall facility is:

PRV = $11,111,244

Facility Condition Index (FCI)

4.2.4. Facility Condition Index Values.

The overall facility the FCI is:

$$\left(1-\frac{\$1{,}926{,}308(DM)}{\$11{,}111{,}244(PRV)}\right)x\ 100\% = 82.7\%$$

When the CA report ROM costs for modernization and codes & standards upgrades are included, the FCI becomes:

$$\left(1-\frac{\$4{,}611{,}072(DM)}{\$11{,}111{,}244\ (PRV)}\right)x\ 100\% = 58.5\%$$

Generally speaking, an FCI in the range of 95-100% indicates good overall condition, 90-95% indicates fair condition, and less than 90% indicates a need for deferred maintenance reduction.

4.2.5. Facility Site Summary. The DM and FCI results for the overall facility as well as for individual buildings are summarized in Table 4.2.5.

Table 4.2.5 Site Summary

	Overall Facility	ATCT	Base Building	E/G Building
Facility GSF	**18,720**	**7,860**	**10,060**	**800**
Commissioned	**1958/1988**	**1958**	**1958/1972**	**1988**
PRV	**$11,111,244**	**$5,296,966**	**$4,753,845**	**$1,060,433**
DM including CA	**$4,611,072**	**$2,556,973**	**$1,822,804**	**$231,295**
DM without CA	**$1,926,308**	**$1,054,173**	**$705,204**	**$166,931**
FCI including CA	**58.5%**	**51.7%**	**61.7%**	**78.2%**
FCI without CA	**82.7%**	**80.1%**	**85.2%**	**84.3%**

Forecasted Costs

4.3. Forecasted Maintenance and Repair (M&R) Costs

4.3.1. 30-Year Average Annual M&R Costs. The average forecasted annual maintenance and repair funding requirement for the facility over the next 30 years is shown in Table 4.3.1. Maintenance and repair costs are categorized as Preventive Maintenance & Repair (operating costs), and Unscheduled Maintenance and Replacement (sustainment costs).

Table 4.3.1 30-Year Average Annual M&R Costs

30-Year Average Annual M&R Costs	
Preventive Maintenance:	$ 64,424
Unscheduled Maintenance:	$ 79,494
Repair:	$ 33,646
Replacement:	$144,312
Total	**$321,875**

Costs Not Included in M&R

The forecasted costs do not include non-maintenance related activities such as janitorial, utility costs, and refuse removal. Also, the costs do not include installed electronic equipment.

4.3.2. Average M&R Cost By System. The most costly systems to maintain over the next 20 years are HVAC and Electrical systems accounting for 62.0% of the total forecasted M&R cost. The following table provides a summary of forecasted facility M&R costs by system.

Table 4.3.2 Average M&R Costs Forecast by System-20 Years

Average M&R Costs Forecast By System		
System	**% of Total M&R Cost**	**Average Annual M&R Cost**
Electrical systems	34.6%	$116,326
HVAC	27.4%	$ 92,113
Others*	38.0%	$128,110
Total	**100%**	**$336,549**

**The "Others" category shown in the chart above includes Interior Finishes, Roofing, Exterior Enclosure, Interior Finishes, Roofing, Plumbing, Kitchen Equipment, Fire Protection, Site Improvements, and all other building systems.*

4.3.3. Year-by-Year Forecast of M&R Costs. The year-by-year M&R cost profile for the next 30 years can be found under Tab 1, "Facility Summary" reports. The profile highlights years in which high M&R costs will occur as facility components reaching the end of their respective life cycles.

The forecasted average renewal & replacement cost tends to increase over the time as the number of facility components reaching their respective life cycles increases. Forecasted Preventive Maintenance cost is approximately $64K per year. Unscheduled Maintenance is approximately $79K per year. If M&R is funded at the forecasted cost levels, the deferred maintenance and the facility condition index will gradually decrease due to the cyclical nature of the life cycle calculations.

The profile highlights years in which high M&R cost will occur as facility components reach the end of their respective life cycles. Analysis of these reports can identify the specific facility components that contribute to the high M&R cost. In the case of TUL, relatively high M&R costs are predicted for the year 2028, totaling over $600K. Major M&R tasks forecasted for 2028 include:

Table 4.3.3 Year-by-Year Major M&R Tasks Forecasted for 2028

Year-by -Year Major M&R Tasks Forecasted - for 2028	
Replace Cab glass panels	$257.6K
Repair circuit breakers and power panel boards	$65.3K
Refinish interior walls	$16.0K
Replace ductwork and insulations	$15.1K

Most Costly Tasks

4.3.4. Ten Most Costly Tasks over the 30-year Forecast. The following table shows the top 10 most costly tasks and their average annual cost over the 30-year life cycle forecast for the facility. These 10 tasks account for 50.1% of the total average annual M&R cost.

Table 4.3.4 Ten Most Costly Tasks over the 30-year Forecast

Task Description	Average Cost Annualized Over 30 Years
Maintain/repair/replace ACs, AHUs, condensers, unit heaters, and thermostat	$43,148
Maintain/repair/replace circuit breakers and power panelboards	$37,079
Inspect/Maintain/refinish/replace roofing, flashing, gutters, and awning	$16,655
Resurface/repair parking lots, and replace concrete sidewalk, pole light base, curb and gutter	$12,844
Repair/replace Cab glass panel and shades	$11,484
Maintain/replace UPS, batteries, load bank, and control load bank	$10,720
Inspect/maintain/replace security system components	$10,273
Maintain/renovate elevator	$7,566
Maintain/replace diesel generator, 300 kW	$6,000
Replace chiller and circulation pumps	$5,568

4.3.5. Facility 6-Year Forecast of High Cost Tasks. The following table shows high cost tasks forecasted by the model over the next six years.

Table 4.3.5 Facility 6-Year Forecast of High Cost Tasks

Task Description	Forecast Year	Estimated Cost (2019)
Replace air-cooled condensers	2021	$41,957
Resurface parking lots, and replace concrete sidewalk, curb, and gutter	2022	$120,776
Replace AHUs, ceiling fans, and exhaust fans	2023	$22,251
Repair/replace circuit breakers, and power panelboards	2024	$47,771
Replace lighting fixtures	2024	$25,380
Replace UPS battery	2024	$16,630
Replace security system components	2024	$22,725

Comparison with General Industry

4.4. Industry Benchmarks. Benchmarks such as M&R cost per square foot, M&R cost as a percent of facility replacement value, and the Facility Condition Index are common measures that are used for comparison purposes. Studies by Whitestone Research, the developer of the CostLab life cycle cost forecast model, found a wide range in average M&R costs depending on the type of facility. For instance Whitestone studies show over 30 years a range in average annual M&R in terms of cost per square foot from $2.84/SF for a high-rise office building to $9.91/SF for an apartment building. The TUL facility results of $17.19/SF are high in comparison. CBRE | Business Analytics studies do not include facilities that closely approximate this facility, so it is recommended the average M&R cost indices produced by the model be used as a basis of comparison among similar facilities in the FAA inventory.

5. FORECASTED SUSTAINMENT PROJECTS

5.1. Jacobs has used the data extrapolated for the CostLab software to aggregate deferred maintenance, forecasted repairs, renewals and replacement into individual projects. A 20 year forecast of sustainment projects is listed in *Appendix D* and summarized in Table 5.1.

The projects presented in *Appendix D* are based upon repair and replacement tasks that are forecasted to be required through year 2036. These projects take into account reduction of deferred maintenance. These are presented as projects to be funded in the current year.

Year-by-year maintenance and repair costs were analyzed and logical times in the facility's service life selected to bundle repair and renewal tasks into projects. Typically tasks were bundled around years when forecasted maintenance and repair costs spike. These years are shown in the "year complete" column above and in the individual project reports. Projects were further aggregated into similar or related building systems that would likely be performed under one contract such as roofing, HVAC, or electrical work.

The following table provides a summary of forecasted sustainment projects for the facility, along with recommended frequencies for 20 year planning.

Table 5.1 TUL - Forecasted Sustainment Projects

Project Builder Number	Scope	Year Complete	Current Year Cost	Year Frequency
001 - TUL	Security Upgrade	2020	$45,564	10
002A-TUL	Refinish-Repair Interior & Exterior	2020	$48,181	10
002B-TUL	Replace Carpet	2020	$9,982	10
002C-TUL	Replace Interior & Exterior	2020	$214,598	One Time
002D-TUL	Repair Interior & Exterior	2020	$44,624	One Time
002E-TUL	Replace Cab Glass and Windows	2020	$269,854	One Time
003 - TUL	Replace Roofing	2020	$330,058	One Time
004 - TUL	Renovate Elevator	2020	$123,125	One Time
005A-TUL	Replace Plumbing	2020	$8,568	15
005B-TUL	Replace Plumbing	2020	$19,621	One Time
006 - TUL	Repair HVAC	2020	$8,829	7
007 - TUL	Replace Stair Pressurization Fan	2020	$4,304	15
008A-TUL	Repair Electrical Systems	2020	$40,943	10
008B-TUL	Replace Electrical Systems	2020	$519,759	One Time
009 - TUL	Replace Uninterruptible Power Supply	2020	$79,318	15
010 - TUL	Replace Appliances and Equipment	2020	$54,675	10
011A-TUL	Site Improvements	2020	$97,694	10
011B-TUL	Site Improvements	2020	$37,616	One Time
012A-TUL	Replace HVAC Controls	2023	$30,893	10
012B-TUL	Replace HVAC	2023	$463,404	One Time
012C-TUL	Repair HVAC	2023	$33,330	One Time
013 - TUL	Replace UPS Batteries	2024	$16,630	10
014 - TUL	Repair Electrical Systems	2025	$1,495	5
015 - TUL	Site Improvements	2025	$13,830	10
016 - TUL	Fire & Life Safety Upgrade	2027	$42,796	One Time
017 - TUL	Replace Cab Glass Shades	2028	$17,386	10
018 - TUL	Repair Roofing	2029	$18,363	One Time
019 - TUL	EG Upgrade	2029	$165,257	One Time
020A-TUL	Replace Interior & Exterior	2033	$169,172	One Time
020B-TUL	Refinish-Repair Interior & Exterior	2033	$27,259	One Time
021A-TUL	Replace Plumbing	2033	$13,723	One Time
021B-TUL	Replace Plumbing	2033	$4,788	One Time
022A-TUL	Repair HVAC	2033	$112,616	One Time
022B-TUL	Replace HVAC	2033	$125,849	One Time
023A-TUL	Repair Electrical Systems	2033	$89,953	One Time
023B-TUL	Replace Electrical Systems	2033	$382,095	One Time
024 - TUL	Replace Central Vacuum	2034	$3,602	One Time

Project Builder Number	Scope	Year Complete	Current Year Cost	Year Frequency
025 - TUL	Site Improvements	2034	$62,614	One Time
026 - TUL	Replace Roofing	2036	$110,998	One Time

*A detailed summary of projects, and task-by-task summaries of each project, are provided in *Appendix D*.

Tab 1 Facility Summary Reports
Facility Planned Replacement Value (PRV) Worksheet
Facility Summary
Average M&R Costs
Most Costly M&R Tasks
Yearly M&R Cost Profile Chart
Facility Building List
Deferred Maintenance Detail
Deferred Maintenance by Uniformat Chart
M&R Costs by System per Year Chart
M&R Costs by Task per Year



Tulsa International Airport ATCT (TUL) - Tulsa, Oklahoma

FACILITY PLANT REPLACEMENT VALUE (PRV)

PROJECT: ATCT - Life Cycle Cost

SITE: Tulsa, Oklahoma

DISCIPLINE: Life Cycle

The Plant Replacement Value (PRV) to replace the existing facility with like construction at the same site without accounting for any upgrades to current codes/standards or modernization which may be required is estimated as follows:

1. Obtained RS Means Costs for Labor & Material for the components and systems in the inventory database developed for the Life-Cycle Model, (RSMEANS "Building Construction Cost Data", 2020 Edition). Cost data based on a National Average.

2. Applied standard construction factors for a construction project to be executed by a General Contractor including 18% for general conditions which includes mobilization and demobilization, 20% Standard Contingency for unforeseen extraneous items not accounted for by the inventory or potential design changes and an additional 20% for specialty construction. 10% for overhead, 10% for Profit and 2% for standard Bond fee.

BUILDING: ATCT — Year Built: 1958 — **Site Visited: 11/20/2019 through 11/21/2019**

ATCT Height to Top of Structure:	156-'7"	VLF	ATCT Has:	9	Active Levels Plus 1	Cab Level
ATCT Cab Height to Cab Floor:	145-'6"	VLF				
ATCT Area (Excluding Cab):	7,460	SF				
Cab Area:	400	SF				
ATCT Type:	Non-Standard				Plant replacement value for the ATCT is:	$ 5,296,966
Owner:	Tulsa Airport Authority					

Base Building

Original Base Building	3,890	SF	Year Built:	1958	Active Levels 1	
1972 Base Building Addition	6,100	SF	Year Built:	1972		
Link	70	SF	Year Built:	1958	Active Levels 1	
					Plant replacement value for the Base Building is:	$ 4,753,845

EG Building

EG Building	800	SF	Year Built:	1988	Active Levels 1	
					Plant replacement value for the EG Building is:	$ 1,060,433
					The total plant replacement value to rebuild the Facility (PRV) is:	$ 11,111,244

This Plant Replacement Value (PRV) estimate is an Order-Of-Magnitude estimate only! It is not an actual Cost Estimate based on an actual Material Take-Off, it does not include Design Costs or Real Estate acquisition costs.

Facility: TUL - Tulsa, OK

City: Tulsa, OK

Summary based on building-specific information

Number of Buildings: 3

Total GSFT: 18,720

Average Construction Date: 1968

Total PRV: $11,111,244

Without CA

Deferred Maintenance: $1,926,308

Net Asset Value: $9,184,936

Facility Condition Index: 82.7%

Including CA

Deferred Maintenance: $4,611,072

Net Asset Value: $6,500,172

Facility Condition Index: 58.5%

Includes 6,100 SF 1972 Addition and 70 SF Link

All costs expressed in ($) 2019

Facility Average M&R Cost

JACOBS

Facility: TUL - Tulsa, OK
City: Tulsa, OK

PRV: $11,111,244
Build Date: 1968
GSFT: 18,720

M&R Average Annual Cost Forecasts

	Current Year	5 Year	10 year	20 year	30 Year
Preventive Maintenace:	$64,904	$63,050	$65,045	$64,311	$64,424
Unscheduled Maintenance:	$78,502	$76,556	$80,107	$79,376	$79,494
Repair:	$6,128	$21,869	$29,290	$34,866	$33,646
Replacement:	$726	$70,728	$124,743	$157,996	$144,312
Total M&R Costs:	$150,260	$232,202	$299,185	$336,549	$321,875
Per GSFT:	$8.03	$12.40	$15.98	$17.98	$17.19
As % of PRV:	1.35%	2.09%	2.69%	3.03%	2.90%

All cost expressed in ($) 2019

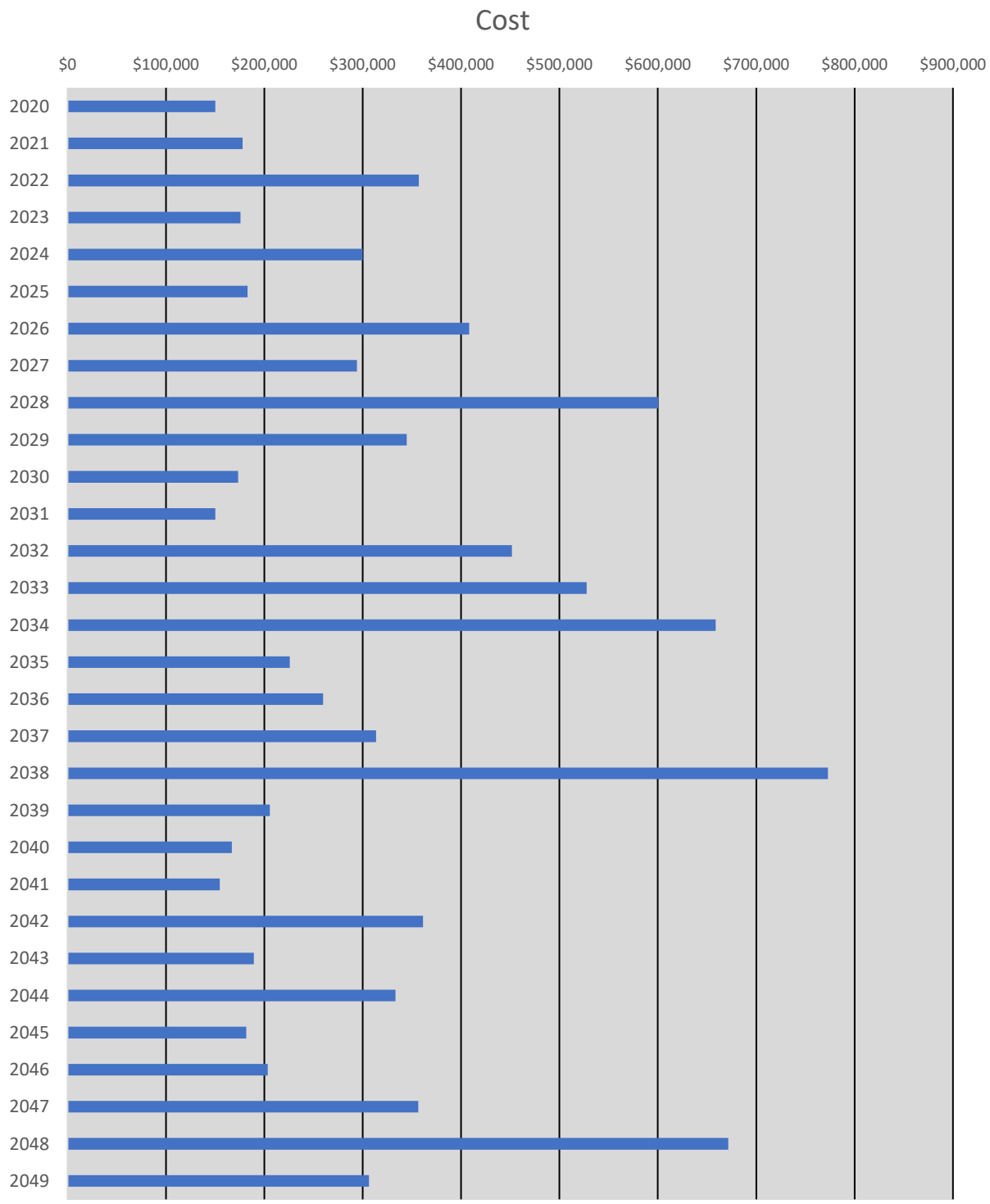
Facility: TUL - Tulsa, OK
City: Tulsa, OK

Average Built Date: 1968
30-Year Total M&R: $7,271,428
GSFT: 18,720

Task	30-Year Total Cost	Percent of Total M&R
Replace Tower Roof - JE	$320,220	4.40%
Resurface Asphaltic Pavement, Parking Lot, >10,000 sq.ft - JE	$293,082	4.03%
Replace Air Conditioner, Computer Room, Air-Cooled (CRAC), 20.0 Ton	$258,656	3.56%
Replace Glass Panels - ATCT Cab (Tiers 2 & 3) - JE	$257,615	3.54%
Replace Air Conditioner, Computer Room, Air-Cooled (CRAC), 15.0 Ton	$214,436	2.95%
Repair Circuit Breaker, 3 Ph., 600 V, 60 Amp	$143,226	1.97%
Replace Generator, Diesel, 300 kW	$135,975	1.87%
Maintain Card Reader	$133,839	1.84%
Replace Circuit Breaker, 600 V, 400 Amp	$123,951	1.70%
Renovate Elevator, Geared, 6-15 Floor, 3,500 Lbs, 350 fpm	$123,125	1.69%
Replace Uninterruptible Power Supply, 100 KW - JE	$120,956	1.66%
Replace Single-Ply PVC Membrane Roof - JE	$106,336	1.46%
Maintain Circuit Breaker, 3 Ph., 600 V, 60 Amp	$106,067	1.46%
Maintain Elevator, Geared, 6-15 Floor, 3,500 Lbs, 350 fpm	$103,849	1.43%
Replace Power Panel Board, 208 Y, 120 V, 225 Amp	$73,753	1.01%
Replace Direct Digital Controls, System Points	$72,975	1.00%
Replace Carpet, Nylon, High Traffic, 20 oz	$67,512	0.93%
Replace Carpet on Access Flooring - JE	$63,318	0.87%
Repair Circuit Breaker, 3 Ph., 600 V, 100 Amp	$60,375	0.83%
Replace Power Panel Board, 208 Y, 120 V, 100 Amp	$57,135	0.79%
Replace Chain Link Fence, 8 Ln Ft	$54,744	0.75%
Maintain Chain Link Fence, 8 Ln Ft	$54,375	0.75%
Replace Cab Glass Shades - JE	$52,158	0.72%
Repair Circuit Breaker, 600 V, 400 Amp	$52,005	0.72%
Replace Condenser, Air-Cooled, 20.0 Ton	$50,695	0.70%
Replace UPS Battery - JE	$49,890	0.69%
Repair Air Conditioner, Computer Room, Air-Cooled (CRAC), 20.0 Ton	$49,685	0.68%
Replace Security Control Panel	$48,932	0.67%
Maintain Circuit Breaker, 3 Ph., 600 V, 100 Amp	$48,762	0.67%
Replace Chiller, Reciprocal, Air-Cooled, 30.0 Ton	$48,313	0.66%
Annual PM UPS Battery - JE	$47,817	0.66%

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK



All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK
City: Tulsa, OK

Building Name	Year Built	Building gsft.	Replacement Value	Deferred Maintenance	Condition Index	Deferred Maintenance (Including CA)	Condtion Index (Including CA)	Last Inspection	Notes
TUL - ATCT	1958	7,860	$5,296,966	$1,054,173	80.1%	$2,556,973	51.7%	11/20/2019	Includes 400 SF Cab
TUL - Base Building	1958	10,060	$4,753,845	$705,204	85.2%	$1,822,804	61.7%	11/20/2019	Includes 6,100 SF 1972 Addition and 70 SF Link
TUL - EG Building	1988	800	$1,060,433	$166,931	84.3%	$231,295	78.2%	11/20/2019	
Total	**1968**	**18,720**	**$11,111,244**	**$1,926,308**	**82.7%**	**$4,611,072**	**58.5%**		

All cost expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building Name: TUL - ATCT

Year Installed	Years Deferred	Deferred Maintenance Tasks	Quantity	UoM	Deferred Maintenance Cost	Equip ID
1958	N/A	TUL - ATCT Duplicates $1,860,160 - $357,360 (APP E)	1	Each	$1,502,800	
1958	27	Replace Glass Panels - ATCT Cab (Tiers 2 & 3) - JE	672	SqFt	$257,615	
2005	1	Replace Tower Roof - JE	675	SqFt	$161,909	
2005	1	Replace Tower Roof - JE	660	SqFt	$158,311	
1958	37	Renovate Elevator, Geared, 6-15 Floor, 3,500 Lbs, 350 fpm	1	Each	$123,125	EL-1
1988	1	Replace Circuit Breaker, 3 Ph., 600 V, 60 Amp	56	Each	$67,356	
1997	4	Replace Air Handler, Multizone, 6,500 Cfm	1	Each	$19,465	AHU-T1
1988	1	Replace Circuit Breaker, 3 Ph., 600 V, 100 Amp	14	Each	$18,573	
1958	43	Replace Air Handler, Single Zone, 2,500 Cfm	2	Each	$15,293	AHU-T2, AHU-T3
1989	1	Replace Power Panel Board, 208 Y, 120 V, 400 Amp	2	Each	$14,588	BPPE, BPPE-2
1997	13	Replace Direct Digital Controls, System Points	24	Each	$13,900	
1988	1	Replace Circuit Breaker, 600 V, 400 Amp	3	Each	$12,823	
1958	27	Replace Ductwork - JE	1,624	Lbs	$10,577	
2000	5	Replace Circulator Pump, 1 HP, Hot Water - JE	2	Each	$8,952	P-T2, P-T3
1958	32	Replace Circuit Breaker, 3 Ph., 600 V, 60 Amp	6	Each	$7,217	
1958	12	Replace Metal, Painted, Interior Railing	300	LnFt	$7,039	
1958	32	Replace Metal, Painted, Exterior Railing	125	LnFt	$6,330	
1958	37	Replace Air Compressor, 2.000 HP	1	Each	$6,264	AC-2
1958	32	Replace Power Panel Board, 208 Y, 120 V, 225 Amp	1	Each	$6,146	Panel 14
1988	2	Replace Power Panel Board, 208 Y, 120 V, 225 Amp	1	Each	$6,146	7th Floor PP
1988	2	Replace Power Panel Board, 208 Y, 120 V, 225 Amp	1	Each	$6,146	Basement LP
1958	42	Replace Receptacle, 120 V, 20 Amp	102	Each	$5,991	
2004	6	Replace Dishwasher, Electric	1	Each	$5,259	
1958	42	Replace Incandescent Lighting Fixture, Basic, 100 W	38	Each	$5,210	
1997	9	Replace Circulation Pump, 2 HP, Hot Water - JE	1	Each	$4,707	P-T1
2004	6	Replace Range/Oven	1	Each	$4,594	
1997	6	Replace Circulation Pump, Chiller & Condenser Water, 5.000 HP	1	Each	$4,578	P-T1C
1958	27	Replace Duct Insulation, Fiberglass - JE	1,299	SqFt	$4,572	
2015	1	Replace Carpet, Nylon, High Traffic, 20 oz	720	SqFt	$4,396	
1958	2	Replace Aluminum Louver, >=, 3 Stories	6	Each	$4,107	
1997	3	Replace Check Valve, 4.00 In	2	Each	$4,015	
1958	32	Replace Power Panel Board, 208 Y, 120 V, 100 Amp	1	Each	$3,809	P7
1958	32	Replace Power Panel Board, 208 Y, 120 V, 100 Amp	1	Each	$3,809	PP8
1988	2	Replace Power Panel Board, 208 Y, 120 V, 100 Amp	1	Each	$3,809	PP8A
1988	2	Replace Power Panel Board, 208 Y, 120 V, 100 Amp	1	Each	$3,809	PP2
1958	32	Replace Metal, Painted, Exterior Railing	74	LnFt	$3,747	
2004	1	Replace Vinyl Tile Flooring	1,420	SqFt	$3,666	
1997	1	Replace Flow Control Valve, Motorized, 2.00 In	2	Each	$3,474	
1997	8	Replace Metasys Controllers - JE	3	Each	$3,429	
1997	3	Replace Emergency Lighting Pack, 2 Light w/ Battery	3	Each	$2,778	
1997	5	Replace Motor Starter, 2.000 HP, 208 V	4	Each	$2,733	
1958	1	Replace Pipe & Fittings, 2" Steel - JE	0.148	KLnFt	$2,696	
1996	5	Replace Exhaust Fan, Propeller, 20,000 Cfm	1	Each	$2,673	SF-1
1988	2	Replace Circuit Breaker, 15/20 Amp. - JE	87	Each	$2,605	
1958	32	Replace Circuit Breaker, 15/20 Amp. - JE	83	Each	$2,485	
1958	42	Replace Fluorescent Lighting Fixture, T12, 60 W	15	Each	$2,340	
1958	1	Replace Pipe & Fittings, 1" Steel - JE	0.135	KLnFt	$1,696	
1958	37	Replace Pipe Insulation, Fiberglass, Heating Water/Steam - JE	0.293	KLnFt	$1,671	

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building Name: TUL - ATCT

Year Installed	Years Deferred	Deferred Maintenance Tasks	Quantity	UoM	Deferred Maintenance Cost	Equip ID
1996	6	Replace Motor Starter, 10.000 HP, 208 V	1	Each	$1,631	
1958	42	Replace LED Obstruction Light - JE	4	Each	$1,529	
1987	11	Replace Air Conditioner, Window, 2.0 Ton	1	Each	$1,454	AC-3
2004	1	Replace Acoustical Tile, Dropped Ceiling - JE	575	SqFt	$1,445	
1958	32	Replace Circuit Breaker, 3 Ph., 600 V, 100 Amp	1	Each	$1,327	
1958	12	Replace Aluminum Fixed Window, >=, 3 Stories, 12 Sq Ft	3	Each	$1,326	
1997	13	Replace Drinking Fountain, Refrigerated	1	Each	$1,290	EWC-T2
1958	22	Replace Floor Drain	5	Each	$1,274	
1958	43	Replace Exhaust Fan, Roof Mounted, 2,000 Cfm	1	Each	$1,213	EF-T1
2004	6	Replace Remote Water Chiller - JE	1	Each	$1,182	EWC-T1
1997	6	Replace Gate Valve, 3.00 In	2	Each	$1,132	
1958	37	Replace Pipe Insulation, Fiberglass, Chilled Water - JE	0.292	KLnFt	$1,113	
1958	47	Replace Wiring Device, Switch	40	Each	$1,075	
1997	3	Replace Chemical Bypass Pot Feeder - JE	1	Each	$1,073	CPF-2
1958	37	Replace Pipe Insulation, Fiberglass, Cold Water - JE	0.283	KLnFt	$1,051	
1997	8	Replace Water Heater, Electric, 5 Gal	1	Each	$813	EWH-T2
1958	12	Replace Disconnect Switch, 60 Amp	1	Each	$747	
1958	42	Replace Fluorescent Lighting Fixture, T12, 40 W	4	Each	$624	
1958	42	Replace Fluorescent Lighting Fixture, T12, 60 W	4	Each	$624	
1958	37	Replace Lightning Protection - JE	0.206	KLnFt	$623	
2004	6	Replace Card Reader	1	Each	$619	
1958	42	Replace Aluminum Gutter, Downspouts, Fittings	0.125	KLnFt	$581	
2004	6	Replace Intrusion Detection Motion Detector, Interior	1	Each	$572	
2005	1	Replace Flashing - JE	198	LnFt	$516	
2004	1	Replace Kitchen Exhaust Hood, Domestic - JE	1	Each	$481	
2004	1	Replace Wallpaper, Interior Wall Finish	400	SqFt	$480	
1958	12	Replace Aluminum Fixed Window, 2 Stories, 12 Sq Ft	1	Each	$417	
2004	6	Replace Disposal, Garbage, Electric	1	Each	$401	D-3
2004	6	Replace Refrigerator, Mini, 3 Cu Ft	1	Each	$325	
1997	6	Replace Calibrated Balancing Valve, 2.00 In	2	Each	$312	
2004	6	Replace Electronic Lock	1	Each	$213	
2005	1	Replace Flashing - JE	76	LnFt	$198	
1958	52	Replace Valve Hose Bib	2	Each	$79	
				Total:	**$2,556,973**	

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building Name: TUL - Base Building

Year Installed	Years Deferred	Deferred Maintenance Tasks	Quantity	UoM	Deferred Maintenance Cost	Equip ID
1958	N/A	TUL - Base Building Duplicates $1,814,178 - $696,578 (APP E)	1	Each	$1,117,600	
1972	38	Resurface Asphaltic Pavement, Parking Lot, >10,000 sq.ft - JE	23,500	SqFt	$97,694	
1972	8	Replace Access Flooring, (Computer Room Raised Floor) - JE	1,905	SqFt	$59,117	
1972	8	Replace Access Flooring w/ Laminate, Raised	1,420	SqFt	$36,637	
1989	1	Replace Circuit Breaker, 600 V, 400 Amp	8	Each	$34,194	
1997	4	Replace Air Handler, Multizone, 10,000 Cfm	1	Each	$29,663	AHU-5
1972	8	Replace Wood, Solid Core, Painted, Interior Door	18	Each	$25,103	
2004	1	Replace Security Control Panel	4	Each	$24,466	
1988	2	Replace Circuit Breaker, 3 Ph., 600 V, 60 Amp	17	Each	$20,447	
2004	6	Replace Kitchen Cabinet, Wood - JE	12	Each	$14,510	
1972	13	Replace Acoustical Interior Wall Tile, Fabric Faced	1,600	SqFt	$14,489	
1972	29	Replace Air Handler, Single Zone, 5,000 Cfm	1	Each	$13,486	AHU-4
1972	23	Replace Concrete Sidewalk, 4" Thick - JE	2,356	SqFt	$11,934	
1989	1	Replace Secondary Transformer, Dry, 150 kVA	1	Each	$11,859	T1
1989	1	Replace Power Panel Board, 208 Y, 120 V, 1,200 Amp	1	Each	$11,826	MDPN
1972	23	Replace Concrete Curb & Gutter - JE	907	LnFt	$11,148	
1989	1	Replace Circuit Breaker, Main, 208 Y, 120 V, 1,200 Amp	1	Each	$11,066	
1972	28	Replace Acoustical Tile, Dropped Ceiling - JE	4,165	SqFt	$10,467	
1997	13	Replace Direct Digital Controls, System Points	18	Each	$10,425	
1972	28	Replace Receptacle, 120 V, 20 Amp	174	Each	$10,220	
2015	1	Replace Glass Curtain Wall	200	SqFt	$9,319	
1958	32	Replace Circuit Breaker, 600 V, 400 Amp	2	Each	$8,548	
1988	7	Replace Concrete Sidewalk, 4" Thick - JE	1,678	SqFt	$8,500	
1958	32	Replace Power Panel Board, 208 Y, 120 V, 600 Amp	1	Each	$8,427	North PP
1972	18	Replace Circuit Breaker, 3 Ph., 600 V, 60 Amp	7	Each	$8,419	
1958	22	Replace Wood, Solid Core, Painted, Interior Door	6	Each	$8,368	
1989	1	Replace Circuit Breaker, 3 Ph., 600 V, 100 Amp	6	Each	$7,960	
1972	18	Replace Power Panel Board, 208 Y, 120 V, 225 Amp	1	Each	$6,146	North LP
1988	2	Replace Power Panel Board, 208 Y, 120 V, 225 Amp	1	Each	$6,146	P2
1989	1	Replace Power Panel Board, 208 Y, 120 V, 225 Amp	1	Each	$6,146	Courtyard LP
2004	1	Replace Kitchen Exhaust Hood, Commercial	1	Each	$6,005	
2010	2	Replace Carpet, Nylon, High Traffic, 20 oz	915	SqFt	$5,586	
1988	17	Replace Compressed Air Dryer	1	Each	$5,533	AD-1
1972	28	Replace Outdoor Pole Light - JE	2	Each	$5,273	
2004	6	Replace Dishwasher, Electric	1	Each	$5,259	
1972	18	Replace Power Panel Board, 208 Y, 120 V, 200 Amp	1	Each	$5,199	Hall PP
1972	18	Replace Power Panel Board, 208 Y, 120 V, 200 Amp	1	Each	$5,199	Hall LP
1972	8	Replace Wood, Solid Core, Painted, Interior Double Door - JE	2	Each	$4,895	
1958	32	Replace Circuit Breaker, 3 Ph., 600 V, 60 Amp	4	Each	$4,811	
2004	6	Replace Range/Oven	1	Each	$4,594	
1958	52	Replace Range/Oven	1	Each	$4,594	
1972	18	Replace Circuit Breaker, 600 V, 400 Amp	1	Each	$4,274	
1988	2	Replace Circuit Breaker, 600 V, 400 Amp	1	Each	$4,274	
1972	25	Replace Secondary Coil, 288 Sq In	8	Each	$4,090	RC-1 thru RC-8
1988	2	Replace Power Panel Board, 208 Y, 120 V, 100 Amp	1	Each	$3,809	P4
1958	1	Replace Clay Brick, Exterior, 1 Story	160	SqFt	$3,607	

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building Name: TUL - Base Building

Year Installed	Years Deferred	Deferred Maintenance Tasks	Quantity	UoM	Deferred Maintenance Cost	Equip ID
2004	6	Replace Camera, Interior, Closed Circuit, Fixed Color	2	Each	$3,545	
1972	28	Replace Fluorescent Lighting Fixture, T12, 40 W	22	Each	$3,432	
1972	18	Replace Metal, Painted, Exterior Railing	65	LnFt	$3,292	
2004	6	Replace Camera, Exterior, Closed Circuit, Fixed Color	1	Each	$3,283	
2004	6	Replace Monitor, Medium, Closed Circuit	1	Each	$3,272	
2004	6	Replace Card Reader	5	Each	$3,094	
1988	7	Replace Air Compressor, 0.750 HP	1	Each	$3,012	AC-1
1958	32	Replace Circuit Breaker, 3 Ph., 600 V, 100 Amp	2	Each	$2,653	
1972	18	Replace Circuit Breaker, 3 Ph., 600 V, 100 Amp	2	Each	$2,653	
2005	5	Replace Water Heater, Gas/Oil, 30 Gph	1	Each	$2,572	WH-1
1972	33	Replace Wiring Device, Switch	92	Each	$2,473	
1972	18	Replace Circuit Breaker, 15/20 Amp. - JE	79	Each	$2,366	
1972	1	Replace Pipe & Fittings, 1" Steel - JE	0.185	KLnFt	$2,324	
2004	6	Replace Cooking Range, Commercial	1	Each	$2,322	
1997	8	Replace Metasys Controllers - JE	2	Each	$2,286	
1972	30	Replace Vinyl Tile Flooring	873	SqFt	$2,254	
1972	1	Replace Pipe & Fittings, 2" Steel - JE	0.112	KLnFt	$2,040	
1997	3	Replace Check Valve, 4.00 In	1	Each	$2,008	
2004	1	Replace Public Address Speaker	7	Each	$1,850	
1987	3	Replace Metal Awning	190	SqFt	$1,845	
1972	1	Replace Steel, Painted, Exterior Door	2	Each	$1,793	
2004	6	Replace Camera, Interior, Closed Circuit, Fixed Color	1	Each	$1,773	
1972	23	Replace Pipe Insulation, Fiberglass, Heating Water/Steam - JE	0.294	KLnFt	$1,676	
1972	28	Replace Incandescent Lighting Fixture, Basic, 100 W	11	Each	$1,508	
1958	42	Replace High Pressure Sodium Lighting Fixture, 250 W	1	Each	$1,462	
1972	30	Replace Vinyl Tile Flooring	566	SqFt	$1,461	
1972	23	Replace Pipe Insulation, Fiberglass, Cold Water - JE	0.374	KLnFt	$1,389	
1988	2	Replace Circuit Breaker, 15/20 Amp. - JE	46	Each	$1,377	
1972	13	Replace Service Sink, Iron, Enamel	1	Each	$1,300	
1989	21	Replace Drinking Fountain, Refrigerated	1	Each	$1,290	EWC-1
1972	8	Replace Steel Roof Access Ladder	15	LnFt	$1,271	
1972	18	Replace Metal, Painted, Exterior Railing	25	LnFt	$1,266	
1958	42	Replace Fluorescent Lighting Fixture, T12, 40 W	8	Each	$1,248	
2004	6	Replace Refrigerator, Domestic	1	Each	$1,203	
1997	8	Replace Ball Valve, 2.00 In	2	Each	$1,147	
2004	6	Replace Intrusion Detection Motion Detector, Interior	2	Each	$1,144	
1997	3	Replace Chemical Bypass Pot Feeder - JE	1	Each	$1,073	CPF-1
2004	6	Replace Electronic Lock	5	Each	$1,066	
1972	29	Replace Exhaust Fan, Roof Mounted, 500 Cfm	1	Each	$1,006	EF-2
1972	1	Replace Pipe & Fittings, 1" Steel - JE	0.077	KLnFt	$967	
1972	1	Replace Steel, Painted, Exterior Door	1	Each	$896	
2004	6	Replace Disposal, Garbage, Electric	2	Each	$801	D-1, D-2
1972	38	Replace Backflow Preventer, 0.75 In	1	Each	$790	
1958	43	Replace Exhaust Fan, Roof Mounted, 400 Cfm	1	Each	$778	EF-3
1958	22	Replace Floor Drain	3	Each	$764	

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building Name: TUL - Base Building

Year Installed	Years Deferred	Deferred Maintenance Tasks	Quantity	UoM	Deferred Maintenance Cost	Equip ID
1997	5	Replace Motor Starter, 2.000 HP, 208 V	1	Each	$683	
1997	5	Replace Motor Starter, 2.000 HP, 208 V	1	Each	$683	
1958	1	Replace Pipe & Fittings, 1" Steel - JE	0.05	KLnFt	$628	
2004	6	Replace Card Reader	1	Each	$619	
1989	1	Replace Transient Voltage Surge Suppression Panel	1	Each	$603	
1972	18	Replace Metal Awning	60	SqFt	$583	
2004	6	Replace Intrusion Detection Motion Detector, Interior	1	Each	$572	
1972	31	Replace Gate Valve, 3.00 In	1	Each	$566	
1972	42	Replace Pressure Reducer Valve, 1.50 In	1	Each	$513	
2004	1	Replace Kitchen Exhaust Hood, Domestic - JE	1	Each	$481	
1958	42	Replace Metal Halide Lighting Fixture, Wall Mount, 150 W	1	Each	$429	
1972	28	Replace Acoustical Tile, Dropped Ceiling - JE	168	SqFt	$422	
1989	1	Replace Circuit Breaker, 15/20 Amp. - JE	10	Each	$299	
2004	6	Replace Microwave Oven	1	Each	$238	
1972	28	Replace Halogen Lighting Fixture, 100 W	1	Each	$219	
1972	30	Replace Vinyl Tile Flooring	72	SqFt	$186	
1958	37	Replace Pipe Insulation, Fiberglass, Cold Water - JE	0.05	KLnFt	$186	
1972	28	Replace Acoustical Tile, Dropped Ceiling - JE	72	SqFt	$181	
2004	1	Replace Wiring Device, Switch	6	Each	$161	
1997	6	Replace Calibrated Balancing Valve, 2.00 In	1	Each	$156	
1972	38	Replace Valve Hose Bib	1	Each	$39	
				Total:	**$1,822,804**	

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building Name: TUL - EG Building

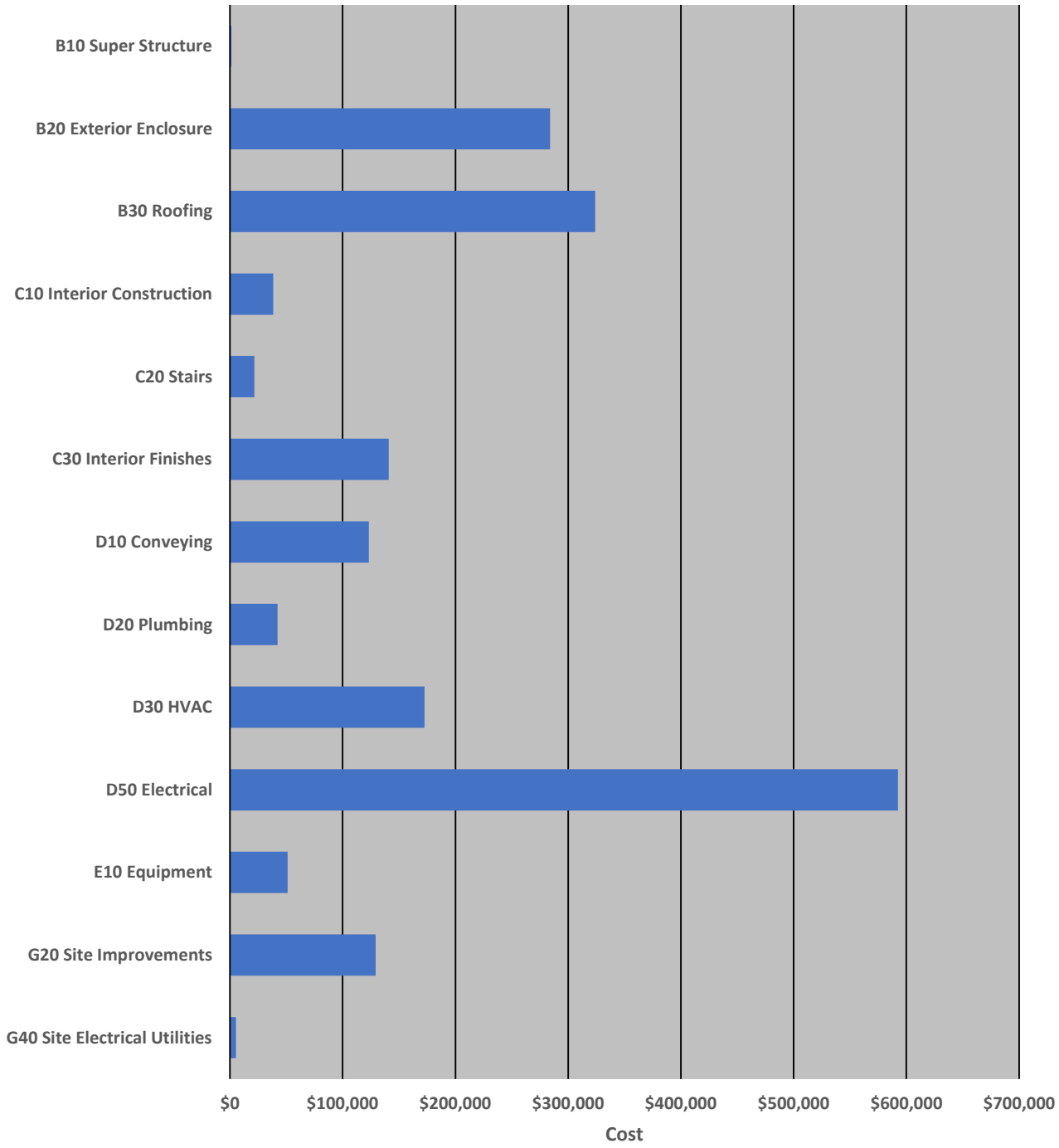
Year Installed	Years Deferred	Deferred Maintenance Tasks	Quantity	UoM	Deferred Maintenance Cost	Equip ID
1988	N/A	TUL - EG Building Duplicates $79,787 - $15,423 (APP E)	1	Each	$64,364	
2002	3	Replace Uninterruptible Power Supply, 100 KW - JE	1	Each	$60,478	UPS
1988	2	Replace Circuit Breaker, 600 V, 400 Amp	7	Each	$29,920	
1988	2	Replace Power Panel Board, 208 Y, 120 V, 800 Amp	2	Each	$19,119	MDPC, MDPE
2002	1	Replace Load Bank, 200 kW	1	Each	$16,413	
2004	1	Replace Load Bank, 300 KW - JE	1	Each	$10,363	
1988	1	Replace Steel, Painted, Exterior Double Door	2	Each	$4,054	
1988	2	Replace Power Panel Board, 208 Y, 120 V, 100 Amp	1	Each	$3,809	LPY
1988	2	Replace Circuit Breaker, 3 Ph., 600 V, 60 Amp	3	Each	$3,608	
1988	2	Replace Circuit Breaker, 3 Ph., 600 V, 100 Amp	2	Each	$2,653	
2002	3	Replace Control Panel, Load Bank - JE	1	Each	$2,427	
2004	1	Replace Control Panel, Load Bank - JE	1	Each	$2,427	
1988	12	Replace Fluorescent Lighting Fixture, T12, 40 W	12	Each	$1,872	
1988	12	Replace Emergency Lighting Pack, 2 Light w/ Battery	2	Each	$1,852	
1988	17	Replace Unit Heater, Electric - JE	2	Each	$1,784	EUH-1, EUH-2
1988	1	Replace Steel, Painted, Exterior Door	1	Each	$896	
1988	7	Replace Pipe & Fittings, 3/4" Copper - JE	0.026	KLnFt	$784	
1988	2	Replace Circuit Breaker, 15/20 Amp. - JE	25	Each	$749	
1988	1	Replace Disconnect Switch, 60 Amp	1	Each	$747	
1988	12	Replace Incandescent Lighting Fixture, Basic, 100 W	5	Each	$686	
1988	12	Replace Fluorescent Lighting Fixture, T12, 60 W	3	Each	$468	
1988	7	Replace Lightning Protection - JE	0.143	KLnFt	$433	
1988	22	Replace Thermostat	2	Each	$427	
1988	12	Replace Receptacle, 120 V, 20 Amp	5	Each	$294	
2004	6	Replace Thermostat	1	Each	$213	
1988	17	Replace Wiring Device, Switch	7	Each	$188	
1988	12	Replace Aluminum Gutter, Downspouts, Fittings	0.024	KLnFt	$112	
1988	7	Replace Pipe Insulation, Fiberglass, Cold Water - JE	0.026	KLnFt	$97	
1988	12	Replace Grounded Fault Circuit Interrupter, 15 Amp	1	Each	$58	
				Total:	**$231,295**	

All costs expressed in ($) 2019

Deferred Maintenance by System Chart JACOBS

Facility: TUL - Tulsa, OK

Ciy: Tulsa, OK

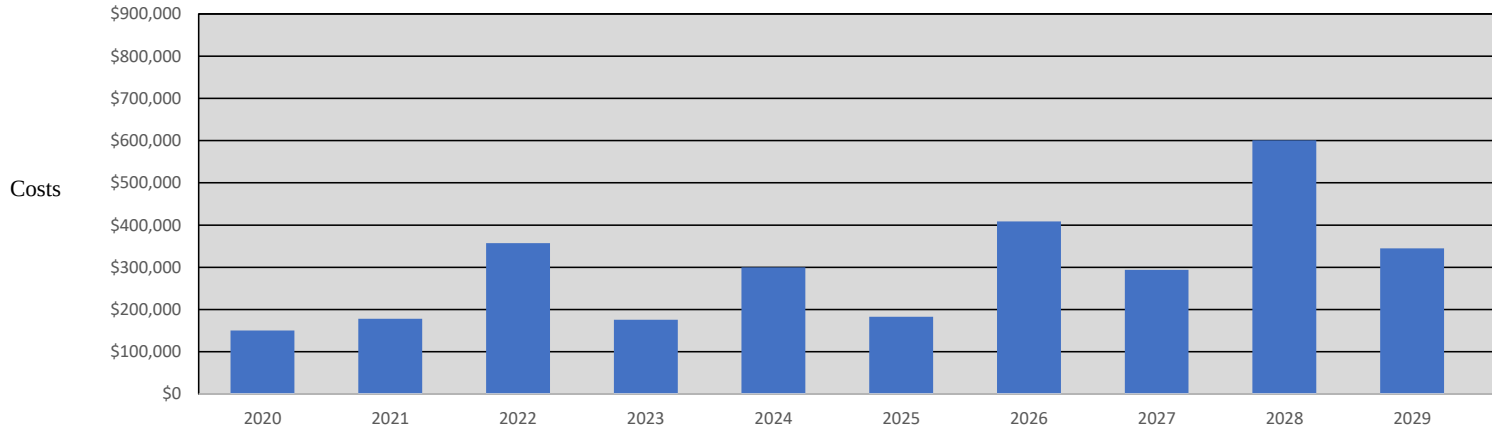


All costs expressed in ($) 2019

GSFT: 18,720

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
B10 Super Structure									$1,102	
B20 Exterior Enclosure	$229	$26	$26,175	$820	$26	$229	$42	$272	$320,048	$26
B30 Roofing	$2,315	$3,043	$2,337	$2,265	$2,265	$6,302	$17,147	$2,752	$2,903	$2,265
C10 Interior Construction	$785	$60	$6,071	$1,982	$918	$104	$1,033	$970	$10,787	$4,288
C20 Stairs	$15		$3,083		$15		$673		$141	
C30 Interior Finishes	$1,429	$338	$15,846	$338	$5,376	$453	$13,716	$25,611	$19,770	$30,137
D10 Conveying	$4,843	$4,843	$4,843	$4,843	$4,843	$4,843	$4,843	$4,843	$4,843	$4,843
D20 Plumbing	$14,016	$8,701	$12,785	$10,237	$11,995	$16,291	$10,452	$12,670	$12,246	$10,076
D30 HVAC	$52,672	$85,997	$60,843	$80,651	$53,440	$58,492	$286,205	$118,922	$73,649	$76,191
D40 Fire Protection	$3,202	$3,202	$3,297	$3,202	$7,543	$3,202	$3,202	$7,548	$3,202	$3,202
D50 Electrical	$63,485	$64,386	$91,419	$64,154	$166,125	$83,404	$63,756	$101,196	$139,122	$206,000
E10 Equipment	$5,294	$5,294	$6,497	$5,294	$40,780	$7,699	$5,294	$5,294	$10,661	$5,294
G20 Site Improvements	$1,975	$1,975	$122,751	$1,975	$6,728	$1,975	$1,975	$14,117	$1,975	$1,975
G40 Site Electrical Utilities			$1,125							$563
Total $	**$150,260**	**$177,865**	**$357,072**	**$175,761**	**$300,054**	**$182,994**	**$408,338**	**$294,195**	**$600,449**	**$344,860**

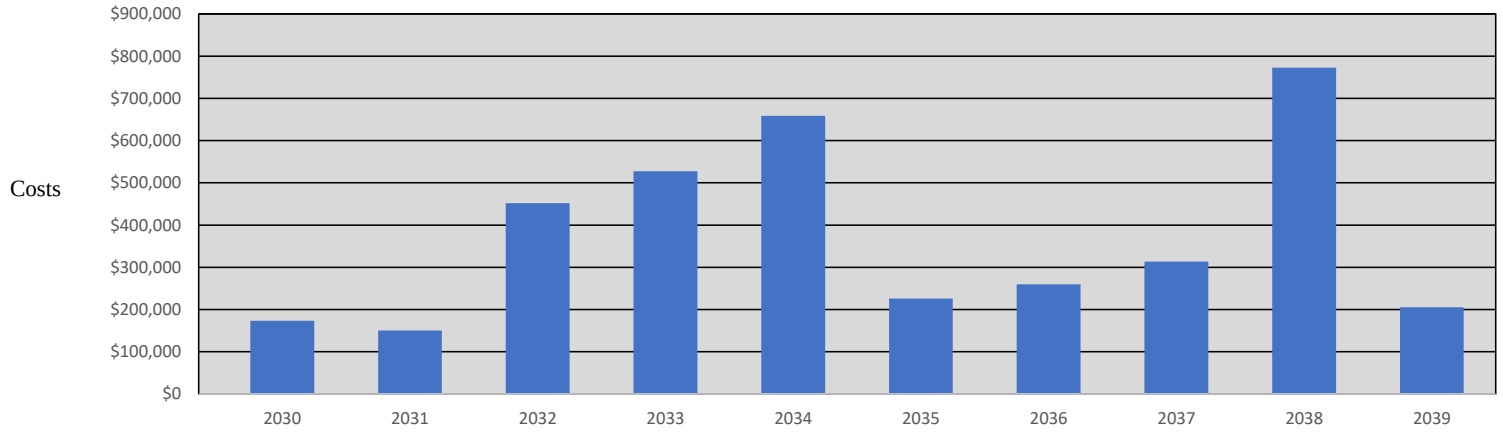


All costs expressed in ($) 2019

GSFT: 18,720

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Forcast Year:	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	Total $
B10 Super Structure			$399		$319						**$1,820**
B20 Exterior Enclosure	$245	$26	$16,155	$60,772	$42	$229	$26	$272	$82,605	$26	**$508,291**
B30 Roofing	$2,315	$3,043	$2,848	$2,265	$2,265	$4,203	$108,610	$2,492	$323,809	$2,979	**$498,423**
C10 Interior Construction	$2,807		$5,596	$39,271	$500	$44	$558	$1,923	$10,776	$727	**$89,200**
C20 Stairs	$659	$20	$4,630	$2,505	$680		$29	$48	$785		**$13,283**
C30 Interior Finishes	$5,735	$423	$18,941	$100,136	$10,108	$16,989	$543	$13,050	$20,332	$32,207	**$331,478**
D10 Conveying	$4,843	$4,843	$4,843	$123,125	$4,843	$4,843	$4,843	$4,843	$4,843	$4,843	**$215,142**
D20 Plumbing	$11,922	$10,505	$12,298	$34,916	$10,992	$12,083	$10,134	$12,888	$15,879	$10,076	**$261,162**
D30 HVAC	$69,752	$57,356	$54,899	$84,739	$86,139	$108,372	$54,930	$182,461	$132,047	$64,496	**$1,842,253**
D40 Fire Protection	$3,202	$3,202	$5,158	$3,202	$3,202	$3,202	$7,543	$3,297	$3,202	$3,202	**$79,214**
D50 Electrical	$64,719	$63,387	$213,571	$69,323	$433,949	$66,195	$65,163	$72,955	$157,561	$76,651	**$2,326,521**
E10 Equipment	$5,294	$5,294	$6,497	$5,294	$50,505	$7,699	$5,294	$5,294	$10,661	$5,294	**$204,527**
G20 Site Improvements	$1,975	$1,975	$99,669	$1,975	$55,389	$1,975	$1,975	$14,117	$10,475	$1,975	**$348,921**
G40 Site Electrical Utilities			$6,034							$3,017	**$10,739**
Total $	**$173,468**	**$150,074**	**$451,538**	**$527,523**	**$658,933**	**$225,834**	**$259,648**	**$313,640**	**$772,975**	**$205,493**	**$6,730,974**



All costs expressed in ($) 2019

M&R Cost by Task per Year

JACOBS

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
B10 Super Structure															
Repair Steel Roof Access Ladder													399		319
Replace Steel Roof Access Ladder									1,102						
B20 Exterior Enclosure															
Clean & Reseal Clay Brick Clay Brick, Exterior, >=, 3 Stories									13,618						
Clean & Reseal Clay Brick Clay Brick, Exterior, 1 Story			4,404						3,487				4,404		
Finish Repaired Steel, Painted, Exterior, >=, 3 Stories														112	
Finish Replaced Steel, Painted Exterior Access Door (Catwalk) - JE															
Finish Replaced Steel, Painted, Exterior Door														20	
Finish Replaced Steel, Painted, Exterior, >=, 3 Stories														10,266	
Maintain Door Locks Steel, Painted, Exterior Door			78	26				78	26				78	13	
Maintain Door Locks Steel, Painted, Exterior Double Door				26					26					26	
Maintain Steel, Painted Exterior Access Door (Catwalk) - JE	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Minor Repair (2% of Walls) Glass Curtain Wall	203					203					203				
Minor Repair Precast Concrete Exterior Wall Panels - JE														1,431	
Recaulk Precast Concrete Exterior Wall Panels - JE				630					630					630	
Refinish Aluminum Louver, >=, 3 Stories									421						
Refinish Aluminum Louver, 1 Story									90						
Refinish Steel, Painted Exterior Access Door (Catwalk) - JE			16				16				16				16
Refinish Steel, Painted, Exterior Door			120						40				120		
Refinish Steel, Painted, Exterior Double Door									79						
Refinish Steel, Painted, Exterior, >=, 3 Stories									6,509						
Repair (2% of Walls) Clay Brick, Exterior, >=, 3 Stories														3,852	
Repair (2% of Walls) Clay Brick, Exterior, 1 Story			1,697											707	
Repair (2% of Walls) Steel, Painted, Exterior, >=, 3 Stories														2,277	
Repair Aluminum Fixed Window, >=, 3 Stories, 12 Sq Ft															
Repair Aluminum Fixed Window, 1 Story, 12 Sq Ft															
Repair Aluminum Fixed Window, 2 Stories, 12 Sq Ft															
Repair Glass Panels - ATCT Cab (Tiers 2 & 3) - JE															

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
B10 Super Structure															
Repair Steel Roof Access Ladder									346				399		
Replace Steel Roof Access Ladder										1,017					
B20 Exterior Enclosure															
Clean & Reseal Clay Brick Clay Brick, Exterior, >=, 3 Stories				13,618										13,618	
Clean & Reseal Clay Brick Clay Brick, Exterior, 1 Story				3,487				4,404						3,487	
Finish Repaired Steel, Painted, Exterior, >=, 3 Stories															
Finish Replaced Steel, Painted Exterior Access Door (Catwalk) - JE				21											
Finish Replaced Steel, Painted, Exterior Door													120		
Finish Replaced Steel, Painted, Exterior, >=, 3 Stories															
Maintain Door Locks Steel, Painted, Exterior Door			78	26				78	26				39	26	
Maintain Door Locks Steel, Painted, Exterior Double Door				26					26					26	
Maintain Steel, Painted Exterior Access Door (Catwalk) - JE	8	8	8		8	8	8	8	8	8	8	8	8	8	8
Minor Repair (2% of Walls) Glass Curtain Wall	203					203					203				
Minor Repair Precast Concrete Exterior Wall Panels - JE															
Recaulk Precast Concrete Exterior Wall Panels - JE				630					630					630	
Refinish Aluminum Louver, >=, 3 Stories				421										421	
Refinish Aluminum Louver, 1 Story				90											
Refinish Steel, Painted Exterior Access Door (Catwalk) - JE								16				16			
Refinish Steel, Painted, Exterior Door				20				120	20					20	
Refinish Steel, Painted, Exterior Double Door				79										79	
Refinish Steel, Painted, Exterior, >=, 3 Stories				5,626					883					5,626	
Repair (2% of Walls) Clay Brick, Exterior, >=, 3 Stories															
Repair (2% of Walls) Clay Brick, Exterior, 1 Story				636									1,697		
Repair (2% of Walls) Steel, Painted, Exterior, >=, 3 Stories															
Repair Aluminum Fixed Window, >=, 3 Stories, 12 Sq Ft				48											
Repair Aluminum Fixed Window, 1 Story, 12 Sq Ft								48							
Repair Aluminum Fixed Window, 2 Stories, 12 Sq Ft				16											
Repair Glass Panels - ATCT Cab (Tiers 2 & 3) - JE				17,366										17,366	

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Repair Steel, Painted Exterior Access Door (Catwalk) - JE									265						
Repair Steel, Painted, Exterior Door													954	159	
Repair Steel, Painted, Exterior Double Door														708	
Replace Aluminum Fixed Window, 1 Story, 12 Sq Ft			1,177												
Replace Aluminum Louver, 1 Story															
Replace Door Locks Steel, Painted, Exterior Door			1,151						384				1,151		
Replace Door Locks Steel, Painted, Exterior Double Door									384						
Replace Glass Curtain Wall															
Replace Glass Panels - ATCT Cab (Tiers 2 & 3) - JE									257,615						
Replace Steel, Painted Exterior Access Door (Catwalk) - JE															
Replace Steel, Painted, Exterior Door														896	
Replace Steel, Painted, Exterior, >=, 3 Stories														17,860	
Repoint (50% of Surface) Clay Brick, Exterior, >=, 3 Stories														18,334	
Repoint (50% of Surface) Clay Brick, Exterior, 1 Story			8,084											3,371	
B30 Roofing															
Maintain Aluminum Gutter, Downspouts, Fittings	29	29	29	29	29	29	29	29	24	29	29	29	29	29	29
Maintain Roof Hatch, Aluminum	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39
Maintain Single-Ply Modified Bituminous/Thermoplastic Roof	57	57	57	57	57		57	57	57	57	57	57	57	57	57
Maintain Single-Ply PVC Membrane Roof - JE	636	636	636	636	636	636	636	636	636	636	636	636	636	636	636
Maintain Tower Roof - JE	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138
Minor Repair Tower Roof - JE						562									
Non-Destructive Moisture Inspection Single-Ply Modified Bituminous/Thermoplastic Roof	50										50				
Non-Destructive Moisture Inspection Single-Ply PVC Membrane Roof - JE		778					778					778			
Refinish Metal Awning			72					227	538						
Repair Metal Awning								260							
Repair Single-Ply Modified Bituminous/Thermoplastic Roof															
Repair Single-Ply PVC Membrane Roof - JE							14,104								
Replace Aluminum Gutter, Downspouts, Fittings									112						
Replace Flashing - JE															

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Repair Steel, Painted Exterior Access Door (Catwalk) - JE															
Repair Steel, Painted, Exterior Door													477	318	
Repair Steel, Painted, Exterior Double Door														708	
Replace Aluminum Fixed Window, 1 Story, 12 Sq Ft															
Replace Aluminum Louver, 1 Story														1,852	
Replace Door Locks Steel, Painted, Exterior Door				192				1,151	192					192	
Replace Door Locks Steel, Painted, Exterior Double Door				384										384	
Replace Glass Curtain Wall															9,319
Replace Glass Panels - ATCT Cab (Tiers 2 & 3) - JE															
Replace Steel, Painted Exterior Access Door (Catwalk) - JE				440											
Replace Steel, Painted, Exterior Door													2,689		
Replace Steel, Painted, Exterior, >=, 3 Stories															
Repoint (50% of Surface) Clay Brick, Exterior, >=, 3 Stories															
Repoint (50% of Surface) Clay Brick, Exterior, 1 Story				3,031									8,084		
B30 Roofing															
Maintain Aluminum Gutter, Downspouts, Fittings	29	29	29	5	29	29	29	29	29	29	29	29	29	24	29
Maintain Roof Hatch, Aluminum	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39
Maintain Single-Ply Modified Bituminous/Thermoplastic Roof	57	57	57	57	57	57	57	57	57	57		57	57	57	57
Maintain Single-Ply PVC Membrane Roof - JE	636		636	636	636	636	636	636	636	636	636	636	636	636	636
Maintain Tower Roof - JE	138	138	138		138	138	138	138	138	138	138	138	138	138	138
Minor Repair Tower Roof - JE	562													562	
Non-Destructive Moisture Inspection Single-Ply Modified Bituminous/Thermoplastic Roof	50					50									
Non-Destructive Moisture Inspection Single-Ply PVC Membrane Roof - JE							778					778			
Refinish Metal Awning			227	538				72							
Repair Metal Awning				616											
Repair Single-Ply Modified Bituminous/Thermoplastic Roof	1,326														
Repair Single-Ply PVC Membrane Roof - JE												14,104			
Replace Aluminum Gutter, Downspouts, Fittings				581										112	
Replace Flashing - JE		1,619			714										

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Replace Membrane Single-Ply Modified Bituminous/Thermoplastic Roof						3,608									
Replace Metal Awning													583		
Replace Single-Ply PVC Membrane Roof - JE															
Replace Tower Roof - JE															
C10 Interior Construction															
Finish Replaced Steel, Painted, Interior Door														539	
Finish Replaced Steel, Painted, Interior Double Door														354	
Finish Replaced Wood, Solid Core, Painted, Interior Door										60					
Maintain Door Locks Steel, Painted, Interior Door			26	386				26	386				26	39	
Maintain Door Locks Steel, Painted, Interior Double Door				116					116						
Maintain Door Locks Wood, Solid Core, Painted, Interior Door	13		232	77	52	13		232	77	13	13		232	77	52
Maintain Wood, Solid Core, Painted, Interior Double Door - JE			26					26					26		
Refinish Steel, Painted, Interior Door	100		539		100		539		100		539		100		
Refinish Steel, Painted, Interior Double Door			354				354				354				
Refinish Wood, Solid Core, Painted, Interior Door	379	60	140		379	60	140		379		140		379	60	140
Refinish Wood, Solid Core, Painted, Interior Double Door - JE	79				79				79				79		
Remove and Reinstall Toilet Partitions - JE											1,547				
Replace Door Locks Steel, Painted, Interior Door			367						5,498				367		
Replace Door Locks Steel, Painted, Interior Double Door									1,649						
Replace Door Locks Wood, Solid Core, Painted, Interior Door	183		3,299		183				1,100		183		3,299		183
Replace Locks Wood, Solid Core, Painted, Interior Double Door - JE			402										402		
Replace Steel, Painted, Interior Door														24,203	
Replace Steel, Painted, Interior Double Door														13,719	
Replace Wood, Solid Core, Painted, Interior Door										4,184					
C20 Stairs															
Finish Repaired Metal, Painted, Exterior Railing												0		3	
Finish Repaired Metal, Painted, Interior Railing														5	0
Finish Repaired Metal, Painted, Interior Stairs														13	
Finish Replaced Metal, Painted, Exterior Railing													57		

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Replace Membrane Single-Ply Modified Bituminous/Thermoplastic Roof											3,608				
Replace Metal Awning													1,845	4,370	
Replace Single-Ply PVC Membrane Roof - JE		106,336													
Replace Tower Roof - JE				320,220											
C10 Interior Construction															
Finish Replaced Steel, Painted, Interior Door													40		
Finish Replaced Steel, Painted, Interior Double Door															
Finish Replaced Wood, Solid Core, Painted, Interior Door				120						20					
Maintain Door Locks Steel, Painted, Interior Door			26	386				26	386					386	
Maintain Door Locks Steel, Painted, Interior Double Door				116					116					116	
Maintain Door Locks Wood, Solid Core, Painted, Interior Door	13		232		52	13		232	77	39	13		232	77	52
Maintain Wood, Solid Core, Painted, Interior Double Door - JE			26					26					26		
Refinish Steel, Painted, Interior Door		100	539			100	539			100	539			60	539
Refinish Steel, Painted, Interior Double Door			354				354				354				354
Refinish Wood, Solid Core, Painted, Interior Door		379	60	20		379	60	140		359	60	140		379	60
Refinish Wood, Solid Core, Painted, Interior Double Door - JE		79				79				79				79	
Remove and Reinstall Toilet Partitions - JE															
Replace Door Locks Steel, Painted, Interior Door				550				367	4,948					550	
Replace Door Locks Steel, Painted, Interior Double Door									1,649						
Replace Door Locks Wood, Solid Core, Painted, Interior Door					550	183		3,299						1,100	550
Replace Locks Wood, Solid Core, Painted, Interior Double Door - JE								402							
Replace Steel, Painted, Interior Door													1,793		
Replace Steel, Painted, Interior Double Door															
Replace Wood, Solid Core, Painted, Interior Door				8,368						1,395					
C20 Stairs															
Finish Repaired Metal, Painted, Exterior Railing													1		
Finish Repaired Metal, Painted, Interior Railing														5	0
Finish Repaired Metal, Painted, Interior Stairs														13	
Finish Replaced Metal, Painted, Exterior Railing												14		126	

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Finish Replaced Metal, Painted, Interior Stairs														470	
Refinish Metal, Painted, Exterior Railing			57				14		126						
Refinish Metal, Painted, Interior Railing	15		189		15		189		15		189		15		189
Refinish Metal, Painted, Interior Stairs			470				470				470				470
Repair Concrete, Exterior Stairs															
Repair Metal, Painted, Exterior Railing												20		178	
Repair Metal, Painted, Interior Railing														268	21
Repair Metal, Painted, Interior Stairs														1,568	
Replace Concrete, Exterior Stairs			730												
Replace Metal, Painted, Exterior Railing													4,558		
Replace Rubber Interior Stairs			1,637												
C30 Interior Finishes															
Clean & Seal Clay Brick, Interior Wall Finish			184				184				184				
Clean & Seal Concrete, Interior Wall Finish			2,018				2,018				2,018				2,018
Finish Repaired Concrete Block, Painted, Interior Wall Finish			30											226	
Finish Repaired Concrete, Painted Ceiling														16	
Finish Repaired Concrete, Painted Flooring														7	
Finish Repaired Gypsum Board, Finished Ceiling															
Finish Repaired Gypsum Board, Interior Wall Finish					10				7				90		
Finish Repaired Metal, Painted Ceiling														13	
Finish Replaced Concrete Block, Painted, Interior Wall Finish														11,281	
Finish Replaced Concrete, Painted Ceiling														780	
Finish Replaced Gypsum Board, Interior Wall Finish															
Finish Replaced Metal, Painted Ceiling														654	
Finish Replaced Plaster Ceiling														1,373	
Finish Replaced Plaster, Interior Wall Finish														3,648	
Minor Repair Access Flooring, (Computer Room Raised Floor) - JE													662		
Minor Repair Acoustical Interior Wall Tile, Fabric Faced	641														
Refinish Concrete Block, Painted, Interior Wall Finish			1,488						11,997				1,488		

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Finish Replaced Metal, Painted, Interior Stairs															
Refinish Metal, Painted, Exterior Railing		14		126				57							
Refinish Metal, Painted, Interior Railing		15		189		15		189		15		189		15	
Refinish Metal, Painted, Interior Stairs				470				470				470			
Repair Concrete, Exterior Stairs			48												
Repair Metal, Painted, Exterior Railing													80		
Repair Metal, Painted, Interior Railing														268	21
Repair Metal, Painted, Interior Stairs														1,568	
Replace Concrete, Exterior Stairs															
Replace Metal, Painted, Exterior Railing												1,114		10,077	
Replace Rubber Interior Stairs						1,637									
C30 Interior Finishes															
Clean & Seal Clay Brick, Interior Wall Finish			184				184				184				184
Clean & Seal Concrete, Interior Wall Finish				2,018				2,018				2,018			
Finish Repaired Concrete Block, Painted, Interior Wall Finish				14									30		
Finish Repaired Concrete, Painted Ceiling															
Finish Repaired Concrete, Painted Flooring														7	
Finish Repaired Gypsum Board, Finished Ceiling	2														
Finish Repaired Gypsum Board, Interior Wall Finish										10				7	
Finish Repaired Metal, Painted Ceiling															
Finish Replaced Concrete Block, Painted, Interior Wall Finish													1,488		
Finish Replaced Concrete, Painted Ceiling															
Finish Replaced Gypsum Board, Interior Wall Finish													4,514		
Finish Replaced Metal, Painted Ceiling															
Finish Replaced Plaster Ceiling															
Finish Replaced Plaster, Interior Wall Finish															
Minor Repair Access Flooring, (Computer Room Raised Floor) - JE													662		
Minor Repair Acoustical Interior Wall Tile, Fabric Faced															
Refinish Concrete Block, Painted, Interior Wall Finish				11,997				1,488						11,997	

All costs expressed in ($) 2019

M&R Cost by Task per Year

JACOBS

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Refinish Concrete, Painted Ceiling									780						
Refinish Concrete, Painted Flooring									338						
Refinish Gypsum Board, Finished Ceiling	87										87				
Refinish Gypsum Board, Interior Wall Finish			4,514		521				355				4,514		521
Refinish Metal, Painted Ceiling									654						
Refinish Plaster Ceiling									1,373						
Refinish Plaster, Interior Wall Finish									3,648						
Repair (2% of Carpet) Carpet, Nylon, High Traffic, 20 oz	112	338	112	338	112	338			112	338	112	338	112	338	
Repair (2% of Ceiling) Concrete, Painted Ceiling														315	
Repair (2% of Ceiling) Gypsum Board, Finished Ceiling															
Repair (2% of Ceiling) Metal Ceiling	421		586						421		586				
Repair (2% of Ceiling) Metal, Painted Ceiling														276	
Repair (2% of Floors) Access Flooring w/ Laminate, Raised													733		
Repair (2% of Floors) Ceramic Tile Flooring						115									
Repair (2% of Floors) Concrete Flooring													37	209	
Repair (2% of Floors) Concrete, Painted Flooring														68	
Repair (2% of Floors) Rubber Tile Flooring												27			
Repair (2% of Floors) Vinyl Tile Flooring			58									58			
Repair (2% of Grating) Metal Floor Grating									57						
Repair (2% of Walls) Ceramic Tile, Interior Wall Finish, 16 Sq In	146										146				
Repair (2% of Walls) Concrete Block, Painted, Interior Wall Finish			291											2,210	
Repair (2% of Walls) Concrete, Interior Wall Finish														597	
Repair (2% of Walls) Gypsum Board, Interior Wall Finish					27				18				235		
Repair (2% of Walls) Plastic, Fiberglass Reinforced, Interior Wall Panels					3										3
Repair (2% of Walls) Wallpaper, Interior Wall Finish	10								10						
Repair Acoustical Tile, Dropped Ceiling - JE	12		221		29										122
Replace Acoustical Interior Wall Tile, Fabric Faced															
Replace Acoustical Tile, Dropped Ceiling - JE					4,674						575		11,070		
Replace Cab Glass Shades - JE								8,693		8,693					

All costs expressed in ($) 2019

M&R Cost by Task per Year

JACOBS

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Refinish Concrete, Painted Ceiling				780										780	
Refinish Concrete, Painted Flooring				338										338	
Refinish Gypsum Board, Finished Ceiling						87									
Refinish Gypsum Board, Interior Wall Finish				355				4,514		521				355	
Refinish Metal, Painted Ceiling				654										654	
Refinish Plaster Ceiling									1,373						
Refinish Plaster, Interior Wall Finish									3,648						
Repair (2% of Carpet) Carpet, Nylon, High Traffic, 20 oz		112	338	112	338	112	338			112	338	112	338	112	338
Repair (2% of Ceiling) Concrete, Painted Ceiling															
Repair (2% of Ceiling) Gypsum Board, Finished Ceiling	7														
Repair (2% of Ceiling) Metal Ceiling		421		586						421		586			
Repair (2% of Ceiling) Metal, Painted Ceiling															
Repair (2% of Floors) Access Flooring w/ Laminate, Raised													733		
Repair (2% of Floors) Ceramic Tile Flooring						115									
Repair (2% of Floors) Concrete Flooring													37	209	
Repair (2% of Floors) Concrete, Painted Flooring														68	
Repair (2% of Floors) Rubber Tile Flooring															27
Repair (2% of Floors) Vinyl Tile Flooring	62											58			
Repair (2% of Grating) Metal Floor Grating				57										57	
Repair (2% of Walls) Ceramic Tile, Interior Wall Finish, 16 Sq In						146									
Repair (2% of Walls) Concrete Block, Painted, Interior Wall Finish				140									291		
Repair (2% of Walls) Concrete, Interior Wall Finish															
Repair (2% of Walls) Gypsum Board, Interior Wall Finish										27				18	
Repair (2% of Walls) Plastic, Fiberglass Reinforced, Interior Wall Panels															3
Repair (2% of Walls) Wallpaper, Interior Wall Finish		10											10		
Repair Acoustical Tile, Dropped Ceiling - JE						12		221							29
Replace Acoustical Interior Wall Tile, Fabric Faced								14,489							
Replace Acoustical Tile, Dropped Ceiling - JE					1,445					4,674					
Replace Cab Glass Shades - JE			8,693		8,693								8,693		8,693

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Replace Carpet on Access Flooring - JE										21,106					
Replace Carpet, Nylon, High Traffic, 20 oz							5,586	16,918							5,586
Replace Clay Brick, Interior Wall Finish														2,585	
Replace Gypsum Board, Interior Wall Finish															
Replace Plaster Ceiling														11,865	
Replace Plaster, Interior Wall Finish														41,245	
Replace Plastic, Fiberglass Reinforced, Interior Wall Panels															
Replace Rubber Tile Flooring			1,359												
Replace Vinyl Tile Flooring							3,901								
Replace Wallpaper, Interior Wall Finish															
Repoint (50% of Surface) Concrete Block, Painted, Interior Wall Finish			2,958											22,430	
D10 Conveying															
Maintain Elevator, Geared, 6-15 Floor, 3,500 Lbs, 350 fpm	3,581	3,581	3,581	3,581	3,581	3,581	3,581	3,581	3,581	3,581	3,581	3,581	3,581		3,581
Renovate Elevator, Geared, 6-15 Floor, 3,500 Lbs, 350 fpm														123,125	
D20 Plumbing															
Check & Adjust Air Compressor, 0.750 HP	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156
Check & Adjust Air Compressor, 2.000 HP	209	209	209	209	209	209	209	209	209	209	209	209	209		209
Check & Adjust Compressed Air Dryer	248	248	248	248	248	124	248	248	248	248	248	248	248	124	248
Drain & Flush Water Heater, Electric, 5 Gal						52									52
Inspect & Lubricate Circulator Pump, Hot Water, 0.083 HP	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102
Install Gasket in Spud Connection Flush Tank Water Closet, One Piece															
Install New Gasket & Bolts Pipe & Fittings, 1" Steel - JE			21											15	
Install New Gasket & Bolts Pipe & Fittings, 2" Steel - JE			9											12	
Install New Gasket & Bolts Pipe & Fittings, 3" Cast Iron - JE			6												
Install New Gasket & Bolts Pipe & Fittings, 4" Cast Iron - JE			24												
Install New Gasket & Bolts Pipe & Fittings, 6" Cast Iron - JE			8												
Maintain Floor Drain	468	468	468	468	468	468	468	468	468	468	468	468	468	468	468
Maintain, 12 Month Backflow Preventer, 0.75 In	15	15		15	15	15	15	15	15	15	15	15		15	15
Maintain, 12 Month Roof Drain, 2.00 In	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Replace Carpet on Access Flooring - JE					21,106										21,106
Replace Carpet, Nylon, High Traffic, 20 oz	16,918							5,586	16,918						
Replace Clay Brick, Interior Wall Finish															
Replace Gypsum Board, Interior Wall Finish													11,745		
Replace Plaster Ceiling															
Replace Plaster, Interior Wall Finish															
Replace Plastic, Fiberglass Reinforced, Interior Wall Panels					145										
Replace Rubber Tile Flooring						1,359									
Replace Vinyl Tile Flooring			3,666							3,901					
Replace Wallpaper, Interior Wall Finish					480										
Repoint (50% of Surface) Concrete Block, Painted, Interior Wall Finish				1,423									2,958		
D10 Conveying															
Maintain Elevator, Geared, 6-15 Floor, 3,500 Lbs, 350 fpm	3,581	3,581	3,581	3,581	3,581	3,581	3,581	3,581	3,581	3,581	3,581	3,581	3,581	3,581	3,581
Renovate Elevator, Geared, 6-15 Floor, 3,500 Lbs, 350 fpm															
D20 Plumbing															
Check & Adjust Air Compressor, 0.750 HP	156	156	156		156	156	156	156	156	156	156	156	156	156	156
Check & Adjust Air Compressor, 2.000 HP	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209
Check & Adjust Compressed Air Dryer	248	248	248	248	248	124	248	248	248	248	248	248	248	124	248
Drain & Flush Water Heater, Electric, 5 Gal							52								52
Inspect & Lubricate Circulator Pump, Hot Water, 0.083 HP	102	102	102		102	102	102	102	102	102	102	102	102	102	102
Install Gasket in Spud Connection Flush Tank Water Closet, One Piece	14														
Install New Gasket & Bolts Pipe & Fittings, 1" Steel - JE													21		
Install New Gasket & Bolts Pipe & Fittings, 2" Steel - JE													9		
Install New Gasket & Bolts Pipe & Fittings, 3" Cast Iron - JE															
Install New Gasket & Bolts Pipe & Fittings, 4" Cast Iron - JE															
Install New Gasket & Bolts Pipe & Fittings, 6" Cast Iron - JE															
Maintain Floor Drain	468	468	468	156	468	468	468	468	468	468	468	468	468	468	468
Maintain, 12 Month Backflow Preventer, 0.75 In	15	15	15	15	15	15	15		15	15	15	15	15	15	15
Maintain, 12 Month Roof Drain, 2.00 In	11	11	11	11	11	11	11	11	11	11		11	11	11	11

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Maintain, 12 Month Roof Drain, 6.00 In	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
Maintain, 12 Month Sump Pump, 0.500 HP	88	88	88	88	59	88	88	88	88	88	88	88	88	88	88
Maintain, 12 Month Water Heater, Electric, 5 Gal	38	38	38	38	38	38	38		38	38	38	38	38	38	38
Maintain, 12 Month Water Heater, Instant Hot, 120 Gph	38	38	38	38	38	38	38	38	38	38	38	38	38		38
Maintain, 3 Month Sump Pump, 0.500 HP	312	312	312	312	208	312	312	312	312	312	312	312	312	312	312
Maintain, 6 Month Roof Drain, 2.00 In	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140
Maintain, 6 Month Roof Drain, 6.00 In	186	186	186	186	186	186	186	186	186	186	186	186	186	186	186
Maintain, 6 Month Sump Pump, 0.500 HP	172	172	172	172	114	172	172	172	172	172	172	172	172	172	172
Maintain, 6 Month Water Heater, Electric, 5 Gal	114	114	114	114	114	114	114		114	114	114	114	114	114	114
Maintain, 6 Month Water Heater, Gas/Oil, 30 Gph	272	272	272	272	272	136	272	136	272	272	272	272	272	272	272
Maintain, 6 Month Water Heater, Instant Hot, 120 Gph	114	114	114	114	114	114	114	114	114	114	114	114	114		114
Overhaul Circulator Pump, Hot Water, 0.083 HP				48					48					48	
Overhaul Sump Pump, 0.500 HP	97					97				48	97				48
Overhaul Water Heater, Gas/Oil, 30 Gph	143		143								143		143		
Recharge Compressed Air Dryer	50			50					50		50				
Repack Gland Gate Valve, 3.00 In					91								46		
Repair Air Compressor, 0.750 HP	667				667				667				667		
Repair Air Compressor, 2.000 HP			672				672				672				
Repair Strainer Service Sink, Iron, Enamel	40								40						
Repair Strainer Sink, Stainless Steel	160								160						
Replace 10' Section Pipe & Fittings, 1" Steel - JE	33										23		33		
Replace 10' Section Pipe & Fittings, 2" Cast Iron - JE											49				
Replace 10' Section Pipe & Fittings, 2" Steel - JE	20										27		20		
Replace 10' Section Pipe & Fittings, 3" Cast Iron - JE	16												16		
Replace 10' Section Pipe & Fittings, 3/4" Copper - JE								8							
Replace 10' Section Pipe & Fittings, 4" Cast Iron - JE	76										88		76		
Replace 10' Section Pipe & Fittings, 6" Cast Iron - JE	37												37		
Replace Air Compressor, 0.750 HP															
Replace Air Compressor, 2.000 HP														6,264	

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Maintain, 12 Month Roof Drain, 6.00 In	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
Maintain, 12 Month Sump Pump, 0.500 HP	29	88	88	88	88	88	88	88	88	59	88	88	88	88	88
Maintain, 12 Month Water Heater, Electric, 5 Gal	38	38	38	38	38	38	38		38	38	38	38	38	38	38
Maintain, 12 Month Water Heater, Instant Hot, 120 Gph	38	38	38	38	38	38	38	38	38	38	38	38	38		38
Maintain, 3 Month Sump Pump, 0.500 HP	104	312	312	312	312	312	312	312	312	208	312	312	312	312	312
Maintain, 6 Month Roof Drain, 2.00 In	140	140	140	140	140	140	140	140	140	140		140	140	140	140
Maintain, 6 Month Roof Drain, 6.00 In	186	186	186	186	186	186	186	186	186	186	186	186	186	186	186
Maintain, 6 Month Sump Pump, 0.500 HP	58	172	172	172	172	172	172	172	172	114	172	172	172	172	172
Maintain, 6 Month Water Heater, Electric, 5 Gal	114	114	114	114	114	114	114		114	114	114	114	114	114	114
Maintain, 6 Month Water Heater, Gas/Oil, 30 Gph	136	272	136	272	272	272	272	272	272	272	136	272	136	272	272
Maintain, 6 Month Water Heater, Instant Hot, 120 Gph	114	114	114	114	114	114	114	114	114	114	114	114	114		114
Overhaul Circulator Pump, Hot Water, 0.083 HP									48					48	
Overhaul Sump Pump, 0.500 HP					48	97					97				48
Overhaul Water Heater, Gas/Oil, 30 Gph						143		143							
Recharge Compressed Air Dryer	50			50					50		50				
Repack Gland Gate Valve, 3.00 In						91									46
Repair Air Compressor, 0.750 HP		667						667				667			
Repair Air Compressor, 2.000 HP			672				672				672				672
Repair Strainer Service Sink, Iron, Enamel		40													
Repair Strainer Sink, Stainless Steel		160													
Replace 10' Section Pipe & Fittings, 1" Steel - JE								23		33					
Replace 10' Section Pipe & Fittings, 2" Cast Iron - JE											49				
Replace 10' Section Pipe & Fittings, 2" Steel - JE								27		20					
Replace 10' Section Pipe & Fittings, 3" Cast Iron - JE										16					
Replace 10' Section Pipe & Fittings, 3/4" Copper - JE															
Replace 10' Section Pipe & Fittings, 4" Cast Iron - JE										76	88				
Replace 10' Section Pipe & Fittings, 6" Cast Iron - JE										37					
Replace Air Compressor, 0.750 HP				3,012											
Replace Air Compressor, 2.000 HP															

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Replace Backflow Preventer, 0.75 In			790										790		
Replace Circulator Pump, Hot Water, 0.083 HP															
Replace Compressed Air Dryer						5,533								5,533	
Replace Compressor Compressed Air Dryer	1,432								1,432						
Replace Coolant & Adjust Drinking Fountain, Refrigerated	76	76	76	76	76	76	76	38	76	38	76	76	76	76	76
Replace Coolant & Adjust Remote Water Chiller - JE	22		22				22		22		22		22		
Replace Drinking Fountain, Refrigerated								1,290		1,290					
Replace Faucet Washer & Clean Trap Lavatory, Vitreous China	92		92		79	13	79	13	79	13	79	13	79	13	79
Replace Faucet Washer & Clean Trap Service Sink, Iron, Enamel	13		13		13		13		13		13		13		13
Replace Faucet Washer & Clean Trap Sink, Stainless Steel	52		52		52		52		52		52		52		52
Replace Floor Drain															
Replace Flush Valve Tankless Water Closet	64										64				
Replace Flush Valve Urinal, Vitreous China					454							454			
Replace Gate Valve, 3.00 In				566								1,132			
Replace Lavatory, Vitreous China				369											
Replace Pipe & Fittings, 2" Cast Iron - JE														4,925	
Replace Pipe & Fittings, 3" Cast Iron - JE															
Replace Pipe & Fittings, 3/4" Copper - JE															
Replace Pipe & Fittings, 4" Cast Iron - JE														8,798	
Replace Pipe & Fittings, 6" Cast Iron - JE															
Replace Pipe Insulation, Fiberglass, Cold Water - JE			1,389											1,237	
Replace Pressure Reducer Valve, 1.50 In	513						513						513		
Replace Pump & Motor Assembly Sump Pump, 0.500 HP					358										
Replace Remote Water Chiller - JE					1,182										1,182
Replace Roof Drain, 2.00 In															
Replace Service Sink, Iron, Enamel															
Replace Sink, Stainless Steel															
Replace Tankless Water Closet															
Replace Urinal, Vitreous China															

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Replace Backflow Preventer, 0.75 In								790							
Replace Circulator Pump, Hot Water, 0.083 HP				969											
Replace Compressed Air Dryer						5,533								5,533	
Replace Compressor Compressed Air Dryer	1,432								1,432						
Replace Coolant & Adjust Drinking Fountain, Refrigerated	76	76	38	76	38	76	76	76	76	76	76	76	38	76	38
Replace Coolant & Adjust Remote Water Chiller - JE		22		22		22		22				22		22	
Replace Drinking Fountain, Refrigerated			1,290		1,290								1,290		1,290
Replace Faucet Washer & Clean Trap Lavatory, Vitreous China	13	79	13	79	13	79	13	79	13	79	13		92		92
Replace Faucet Washer & Clean Trap Service Sink, Iron, Enamel		13		13		13				13		13		13	
Replace Faucet Washer & Clean Trap Sink, Stainless Steel		52		52		52		52				52		52	
Replace Floor Drain				2,038											
Replace Flush Valve Tankless Water Closet						64									
Replace Flush Valve Urinal, Vitreous China				454											
Replace Gate Valve, 3.00 In						566								1,132	
Replace Lavatory, Vitreous China											2,212				
Replace Pipe & Fittings, 2" Cast Iron - JE															
Replace Pipe & Fittings, 3" Cast Iron - JE													1,588		
Replace Pipe & Fittings, 3/4" Copper - JE				784											
Replace Pipe & Fittings, 4" Cast Iron - JE													7,566		
Replace Pipe & Fittings, 6" Cast Iron - JE													3,768		
Replace Pipe Insulation, Fiberglass, Cold Water - JE				97									1,389		
Replace Pressure Reducer Valve, 1.50 In				513						513					
Replace Pump & Motor Assembly Sump Pump, 0.500 HP	715									358					
Replace Remote Water Chiller - JE										1,182					
Replace Roof Drain, 2.00 In											1,124				
Replace Service Sink, Iron, Enamel								1,300							
Replace Sink, Stainless Steel										2,440					
Replace Tankless Water Closet											2,777				
Replace Urinal, Vitreous China											1,271				

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Replace Valve Hose Bib			39						79				39		
Replace Valve Set Lavatory, Vitreous China	606										606			101	
Replace Valve Set Service Sink, Iron, Enamel			101										101		
Replace Valve Set Sink, Stainless Steel					404										404
Replace Washer & Spud Connection Lavatory, Vitreous China					173						29	173			
Replace Washer in Ball Cock Flush Tank Water Closet, One Piece	19					19					19				
Replace Water Heater, Electric, 5 Gal								813							
Replace Water Heater, Gas/Oil, 30 Gph						2,572		2,572							
Replace Water Heater, Instant Hot, 120 Gph														532	
Replace Worn Parts Flush Tank Water Closet, One Piece											57				
Resolder Joint Pipe & Fittings, 3/4" Copper - JE								0							
Re-tape Pipe Insulation, Fiberglass, Cold Water - JE				79				82	79				82	6	
D30 HVAC															
Clean Fire Box Boiler, Gas, 300 Mbh	68		68		68		68		68		68		68		68
Clean Fire Box Boiler, Gas, 750 Mbh	136		136		136		136		136		136		136		136
Inspect & Lubricate Circulator Pump, 1 HP, Hot Water - JE	86	86	86	86	86	86	86	86	86	43	43	86	86	86	86
Inspect & Maintain Controller, Fuel Oil Level - JE	12	12	12	12	12	12	12	12	12	12	12	12	12	12	
Inspect & Maintain Metasys Controllers - JE	93	93	93	93	93	93	93		93	93	93	93	93	93	93
Inspect & Test Boiler, Gas, 300 Mbh	556	556	556	556	556	556	556	556	556	556	556	556	556	556	556
Inspect & Test Boiler, Gas, 750 Mbh	1,113	1,113	1,113	1,113	1,113	1,113	1,113	1,113	1,113	1,113	1,113	1,113	1,113	1,113	1,113
Install New Gasket & Bolts Pipe & Fittings, 1" Steel - JE			11												
Install New Gasket & Bolts Pipe & Fittings, 2" Steel, Gas - JE			8												
Install New Gasket & Bolts Pipe & Fittings, 3" Steel - JE			4												
Install New Gasket & Bolts Pipe & Fittings, 3/4" Steel - JE			13												
Maintain Air Conditioner, Rooftop, Single Zone, 7.5 Ton	713	713	713	713	713	713	713		713	713	713	713	713	713	713
Maintain Chiller, Reciprocal, Air-Cooled, 30.0 Ton	710	710	710	710	710	710	710	710	710	710	710	710	710	710	710
Maintain Circulation Pump, 2 HP, Hot Water - JE	80	80	80	80	80	40	80	80	80	80	80	80	80	40	80
Maintain Circulation Pump, Chiller & Condenser Water, 5.000 HP	168	168	168	168	168	168	168	168	168	168	168		168	168	168
Maintain Direct Digital Controls, System Points	856	856	856	856	856	856	856		856	856	856	856	856	856	856

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Replace Valve Hose Bib				79				39						79	
Replace Valve Set Lavatory, Vitreous China						606			101						
Replace Valve Set Service Sink, Iron, Enamel															
Replace Valve Set Sink, Stainless Steel															
Replace Washer & Spud Connection Lavatory, Vitreous China			29	173						29					
Replace Washer in Ball Cock Flush Tank Water Closet, One Piece	19					19					19				
Replace Water Heater, Electric, 5 Gal								813							
Replace Water Heater, Gas/Oil, 30 Gph	2,572		2,572								2,572		2,572		
Replace Water Heater, Instant Hot, 120 Gph														532	
Replace Worn Parts Flush Tank Water Closet, One Piece											57				
Resolder Joint Pipe & Fittings, 3/4" Copper - JE															
Re-tape Pipe Insulation, Fiberglass, Cold Water - JE			82	73				82	79					79	
D30 HVAC															
Clean Fire Box Boiler, Gas, 300 Mbh		68		68		68		68		68				68	
Clean Fire Box Boiler, Gas, 750 Mbh		136		136		136		136		136				136	
Inspect & Lubricate Circulator Pump, 1 HP, Hot Water - JE	86	86	86	86	86	86	86	86	86	43	43	86	86	86	86
Inspect & Maintain Controller, Fuel Oil Level - JE	12	12	12	12	12	12	12	12	12	12	12	12	12	12	
Inspect & Maintain Metasys Controllers - JE	93	93	93	93	93	93	93		93	93	93	93	93	93	93
Inspect & Test Boiler, Gas, 300 Mbh	556	556	556	556	556	556	556	556	556	556	556		556	556	556
Inspect & Test Boiler, Gas, 750 Mbh	1,113	1,113	1,113	1,113	1,113	1,113	1,113	1,113	1,113	1,113	1,113		1,113	1,113	1,113
Install New Gasket & Bolts Pipe & Fittings, 1" Steel - JE															
Install New Gasket & Bolts Pipe & Fittings, 2" Steel, Gas - JE															
Install New Gasket & Bolts Pipe & Fittings, 3" Steel - JE													4		
Install New Gasket & Bolts Pipe & Fittings, 3/4" Steel - JE															
Maintain Air Conditioner, Rooftop, Single Zone, 7.5 Ton	713	713	713	713	713	713	713	713	713		713	713	713	713	713
Maintain Chiller, Reciprocal, Air-Cooled, 30.0 Ton	710	710	710		710	710	710	710	710	710	710	710	710	710	710
Maintain Circulation Pump, 2 HP, Hot Water - JE	80	80	80	80	40	80	80	80	80	80	80	80	40	80	80
Maintain Circulation Pump, Chiller & Condenser Water, 5.000 HP	168	168	168	168	168	168	168	168	168	168	168	168	168		168
Maintain Direct Digital Controls, System Points	856	856		856	856	856	856	856	856	856	856	856		856	856

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Maintain Exhaust Fan, Bathroom 150 cfm - JE	62	62	62	62	62	62	62	62	62	62	62	62	62		62
Maintain Expansion Tank, 100 Gal	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62
Maintain Expansion Tank, 30 Gal	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62
Maintain Expansion Tank, 60 Gal	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
Maintain Fuel Tank, 2000 Gal. - JE	233	233	233	233	233	233	233	233	233	233	233	233	233	233	233
Maintain Generator Day Tank, 65 Gal	19	19	19	19	19	19	19	19	19	19	19	19	19	19	
Maintain Residential Type Ceiling Fan	46	46	46		46	46	46	46	46	46	46	46	46	46	46
Maintain Thermostat	61	81	81	81	61	81	81	81	40	81	61	81	81	81	61
Maintain Unit Heater, Electric - JE	79	79	79	79	79	79	79	79	79	79	79	79	79		79
Maintain, 1 Month Chiller, Reciprocal, Air-Cooled, 30.0 Ton	744	744	744	744	744	744	744	744	744	744	744	744	744	744	744
Maintain, 12 Month Air Handler, Multizone, 10,000 Cfm	897	897	897	897	897	897	897	897	897	897	897	897	897	897	897
Maintain, 12 Month Air Handler, Multizone, 6,500 Cfm	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
Maintain, 12 Month Air Handler, Single Zone, 1,300 Cfm	1,268	1,268	1,268	634	1,268	1,268	1,268	1,268	1,268	1,268	1,268	1,268	1,268	1,268	1,268
Maintain, 12 Month Air Handler, Single Zone, 2,500 Cfm	951	951	951	634	951	951	951	951	951	951	951	951	951	951	317
Maintain, 12 Month Air Handler, Single Zone, 5,000 Cfm	317	317	317	317	317	317	317	317	317		317	317	317	317	317
Maintain, 12 Month Check Valve, 4.00 In	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83
Maintain, 12 Month Chiller, Reciprocal, Air-Cooled, 30.0 Ton	176	176	176	176	176	176	176	176	176	176	176	176	176	176	176
Maintain, 12 Month Condenser, Air-Cooled, 10.0 Ton	52	52	52	52	52	52	52	52	52	52	52	52	52	52	
Maintain, 12 Month Condenser, Air-Cooled, 15.0 Ton	105		105	105	105	105	105	105	105	105	105	105	105	105	105
Maintain, 12 Month Condenser, Air-Cooled, 20.0 Ton	157	52	157	157	157	157	157	157	157	157	157	157	157	157	105
Maintain, 12 Month Condenser, Air-Cooled, 3.0 Ton	210	105	210	210	210	210	210	210	210	210	210	210	210	105	210
Maintain, 12 Month Condenser, Air-Cooled, 7.5 Ton	52		52	52	52	52	52	52	52	52	52	52	52	52	52
Maintain, 12 Month Exhaust Fan, Propeller, 20,000 Cfm	64	64	64	64	64	64	64	64	64	64	64	64	64	64	
Maintain, 3 Month Air Handler, Multizone, 10,000 Cfm	204	204	204	204	204	204	204	204	204	204	204	204	204	204	204
Maintain, 3 Month Air Handler, Multizone, 6,500 Cfm	204	204	204	204	204	204	204	204	204	204	204	204	204	204	204
Maintain, 3 Month Air Handler, Single Zone, 1,300 Cfm	1,072	1,072	1,072	536	1,072	1,072	1,072	1,072	1,072	1,072	1,072	1,072	1,072	1,072	1,072
Maintain, 3 Month Air Handler, Single Zone, 2,500 Cfm	804	804	804	536	804	804	804	804	804	804	804	804	804	804	268
Maintain, 3 Month Air Handler, Single Zone, 5,000 Cfm	268	268	268	268	268	268	268	268	268		268	268	268	268	268
Maintain, 3 Month Chiller, Reciprocal, Air-Cooled, 30.0 Ton	248	248	248	248	248	248	248	248	248	248	248	248	248	248	248

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Maintain Exhaust Fan, Bathroom 150 cfm - JE	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62
Maintain Expansion Tank, 100 Gal	62	62	62	62	62	62	62	62	62	62	62	62	31	62	62
Maintain Expansion Tank, 30 Gal	62	62	62	62	62	62	62	62	62	62	62	62		62	62
Maintain Expansion Tank, 60 Gal	31	31	31	31	31	31	31	31	31	31	31	31		31	31
Maintain Fuel Tank, 2000 Gal. - JE	233	233	233	233	233	233	233	233		233	233	233	233	233	233
Maintain Generator Day Tank, 65 Gal	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19
Maintain Residential Type Ceiling Fan	46	46	46	46	46	46	46		46	46	46	46	46	46	46
Maintain Thermostat	81	81	81	40	81	61	81	81	81	61	81	81	81	40	81
Maintain Unit Heater, Electric - JE	79	79	79	79	79	79	79	79	79	79	79	79	79		79
Maintain, 1 Month Chiller, Reciprocal, Air-Cooled, 30.0 Ton	744	744	744		744	744	744	744	744	744	744	744	744	744	744
Maintain, 12 Month Air Handler, Multizone, 10,000 Cfm		897	897	897	897	897	897	897	897	897	897	897	897	897	897
Maintain, 12 Month Air Handler, Multizone, 6,500 Cfm		400	400	400	400	400	400	400	400	400	400	400	400	400	400
Maintain, 12 Month Air Handler, Single Zone, 1,300 Cfm	634	1,268	1,268	1,268	1,268	1,268	1,268	634	1,268	1,268	1,268	1,268	1,268	1,268	1,268
Maintain, 12 Month Air Handler, Single Zone, 2,500 Cfm	951	951	951	951	951	951	951	634	951	951	951	951	951	951	951
Maintain, 12 Month Air Handler, Single Zone, 5,000 Cfm	317	317	317	317	317	317	317	317	317	317	317	317	317		317
Maintain, 12 Month Check Valve, 4.00 In	83	62	21	83	83	83	83	83	83	83	83	83	83	83	83
Maintain, 12 Month Chiller, Reciprocal, Air-Cooled, 30.0 Ton	176	176	176		176	176	176	176	176	176	176	176	176	176	176
Maintain, 12 Month Condenser, Air-Cooled, 10.0 Ton	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52
Maintain, 12 Month Condenser, Air-Cooled, 15.0 Ton	105	105	105		105	105	105	105	105	105	105	105	105	105	105
Maintain, 12 Month Condenser, Air-Cooled, 20.0 Ton	157	157	157	52	157	157	157	157	157	157	157	157	157	157	157
Maintain, 12 Month Condenser, Air-Cooled, 3.0 Ton	210	210	210	105	210	210	210	210	210	210	210	210	210	210	210
Maintain, 12 Month Condenser, Air-Cooled, 7.5 Ton	52	52	52		52	52	52	52	52	52	52	52	52	52	52
Maintain, 12 Month Exhaust Fan, Propeller, 20,000 Cfm	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64
Maintain, 3 Month Air Handler, Multizone, 10,000 Cfm		204	204	204	204	204	204	204	204	204	204	204	204	204	204
Maintain, 3 Month Air Handler, Multizone, 6,500 Cfm		204	204	204	204	204	204	204	204	204	204	204	204	204	204
Maintain, 3 Month Air Handler, Single Zone, 1,300 Cfm	536	1,072	1,072	1,072	1,072	1,072	1,072	536	1,072	1,072	1,072	1,072	1,072	1,072	1,072
Maintain, 3 Month Air Handler, Single Zone, 2,500 Cfm	804	804	804	804	804	804	804	536	804	804	804	804	804	804	804
Maintain, 3 Month Air Handler, Single Zone, 5,000 Cfm	268	268	268	268	268	268	268	268	268	268	268	268	268		268
Maintain, 3 Month Chiller, Reciprocal, Air-Cooled, 30.0 Ton	248	248	248		248	248	248	248	248	248	248	248	248	248	248

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Maintain, 3 Month Condenser, Air-Cooled, 10.0 Ton	312	312	312	312	312	312	312	312	312	312	312	312	312	312	
Maintain, 3 Month Condenser, Air-Cooled, 15.0 Ton	624		624	624	624	624	624	624	624	624	624	624	624	624	624
Maintain, 3 Month Condenser, Air-Cooled, 20.0 Ton	936	312	936	936	936	936	936	936	936	936	936	936	936	936	624
Maintain, 3 Month Condenser, Air-Cooled, 3.0 Ton	1,248	624	1,248	1,248	1,248	1,248	1,248	1,248	1,248	1,248	1,248	1,248	1,248	624	1,248
Maintain, 3 Month Condenser, Air-Cooled, 7.5 Ton	312		312	312	312	312	312	312	312	312	312	312	312	312	312
Maintain, 6 Month Air Conditioner, Computer Room, Air-Cooled (CRAC), 15.0 Ton	940	940	940	940	940	940		940	940	940	940	940	940	940	940
Maintain, 6 Month Air Conditioner, Computer Room, Air-Cooled (CRAC), 20.0 Ton	1,008	1,008	1,008	1,008	1,008	1,008		1,008	1,008	1,008	1,008	1,008	1,008	1,008	1,008
Maintain, 6 Month Air Conditioner, Window, 1.0 Ton	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206
Maintain, 6 Month Air Conditioner, Window, 2.0 Ton	412	412	412	412	412	412	412	412	412	412	412	206	412	412	412
Maintain, 6 Month Chiller, Reciprocal, Air-Cooled, 30.0 Ton	164	164	164	164	164	164	164	164	164	164	164	164	164	164	164
Maintain, 6 Month Condenser, Air-Cooled, 10.0 Ton	32	32	32	32	32	32	32	32	32	32	32	32	32	32	
Maintain, 6 Month Condenser, Air-Cooled, 15.0 Ton	66		66	66	66	66	66	66	66	66	66	66	66	66	66
Maintain, 6 Month Condenser, Air-Cooled, 20.0 Ton	98	32	98	98	98	98	98	98	98	98	98	98	98	98	66
Maintain, 6 Month Condenser, Air-Cooled, 3.0 Ton	132	66	132	132	132	132	132	132	132	132	132	132	132	66	132
Maintain, 6 Month Condenser, Air-Cooled, 7.5 Ton	32		32	32	32	32	32	32	32	32	32	32	32	32	32
Maintain, 6 Month Exhaust Fan, Propeller, 1,000 Cfm	258	258	258		258	258	258	258	258	258	258	258	258	258	258
Maintain, 6 Month Exhaust Fan, Propeller, 20,000 Cfm	172	172	172	172	172	172	172	172	172	172	172	172	172	172	
Maintain, 6 Month Exhaust Fan, Propeller, 375 Cfm	516	516	516	258	258	516	516	516	516	516	516	516	516	516	516
Maintain, 6 Month Exhaust Fan, Propeller, 800 Cfm	258	258	258	258	258	258	258	258	258	258	258	258	258	258	258
Maintain, 6 Month Exhaust Fan, Roof Mounted, 1,500 Cfm	258	258	258	258	258	258	258	258	258	258	258	258	258	258	258
Maintain, 6 Month Exhaust Fan, Roof Mounted, 2,000 Cfm	258	258	258	258	258	258	258	258	258	258	258	258	258	258	
Maintain, 6 Month Exhaust Fan, Roof Mounted, 400 Cfm	258	258	258	258	258	258	258	258	258	258	258	258	258	258	
Maintain, 6 Month Exhaust Fan, Roof Mounted, 500 Cfm	258	258	258	258	258	258	258	258	258		258	258	258	258	258
Maintain, 6 Month Steel Damper, Motorized	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136
Minor Repair Controller, Fuel Oil Level - JE					184					184					
Minor Repair Metasys Controllers - JE			967										967		
Overhaul Circulator Pump, 1 HP, Hot Water - JE	172				172	172									172
Refinish Steel Damper, Motorized					31										31
Repair Air Conditioner, Computer Room, Air-Cooled (CRAC), 15.0 Ton															

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Maintain, 3 Month Condenser, Air-Cooled, 10.0 Ton	312	312	312	312	312	312	312	312	312	312	312	312	312	312	312
Maintain, 3 Month Condenser, Air-Cooled, 15.0 Ton	624	624	624		624	624	624	624	624	624	624	624	624	624	624
Maintain, 3 Month Condenser, Air-Cooled, 20.0 Ton	936	936	936	312	936	936	936	936	936	936	936	936	936	936	936
Maintain, 3 Month Condenser, Air-Cooled, 3.0 Ton	1,248	1,248	1,248	624	1,248	1,248	1,248	1,248	1,248	1,248	1,248	1,248	1,248	1,248	1,248
Maintain, 3 Month Condenser, Air-Cooled, 7.5 Ton	312	312	312		312	312	312	312	312	312	312	312	312	312	312
Maintain, 6 Month Air Conditioner, Computer Room, Air-Cooled (CRAC), 15.0 Ton	940	940	940	940	940	940	940	940	940	940	940	940	940		940
Maintain, 6 Month Air Conditioner, Computer Room, Air-Cooled (CRAC), 20.0 Ton	1,008	1,008	1,008	1,008	1,008	1,008	1,008	1,008	1,008	1,008	1,008	1,008	1,008		1,008
Maintain, 6 Month Air Conditioner, Window, 1.0 Ton	206		206	206	206	206	206	206	206	206	206	206	206	206	206
Maintain, 6 Month Air Conditioner, Window, 2.0 Ton	412	412	412	412	206	412	412	412	412	412	412	412	412	412	412
Maintain, 6 Month Chiller, Reciprocal, Air-Cooled, 30.0 Ton	164	164	164		164	164	164	164	164	164	164	164	164	164	164
Maintain, 6 Month Condenser, Air-Cooled, 10.0 Ton	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
Maintain, 6 Month Condenser, Air-Cooled, 15.0 Ton	66	66	66		66	66	66	66	66	66	66	66	66	66	66
Maintain, 6 Month Condenser, Air-Cooled, 20.0 Ton	98	98	98	32	98	98	98	98	98	98	98	98	98	98	98
Maintain, 6 Month Condenser, Air-Cooled, 3.0 Ton	132	132	132	66	132	132	132	132	132	132	132	132	132	132	132
Maintain, 6 Month Condenser, Air-Cooled, 7.5 Ton	32	32	32		32	32	32	32	32	32	32	32	32	32	32
Maintain, 6 Month Exhaust Fan, Propeller, 1,000 Cfm	258	258	258	258	258	258	258		258	258	258	258	258	258	258
Maintain, 6 Month Exhaust Fan, Propeller, 20,000 Cfm	172	172	172	172	172	172	172	172	172	172	172	172	172	172	172
Maintain, 6 Month Exhaust Fan, Propeller, 375 Cfm	516	516	516	516	516	516	516	258	258	516	516	516	516	516	516
Maintain, 6 Month Exhaust Fan, Propeller, 800 Cfm		258	258	258	258	258	258	258	258	258	258	258	258	258	258
Maintain, 6 Month Exhaust Fan, Roof Mounted, 1,500 Cfm		258	258	258	258	258	258	258	258	258	258	258	258	258	258
Maintain, 6 Month Exhaust Fan, Roof Mounted, 2,000 Cfm	258	258	258	258	258	258	258	258	258	258	258	258	258	258	258
Maintain, 6 Month Exhaust Fan, Roof Mounted, 400 Cfm	258	258	258	258	258	258	258	258	258	258	258	258	258	258	258
Maintain, 6 Month Exhaust Fan, Roof Mounted, 500 Cfm	258	258	258	258	258	258	258	258	258	258	258	258	258		258
Maintain, 6 Month Steel Damper, Motorized	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136
Minor Repair Controller, Fuel Oil Level - JE					184					184					
Minor Repair Metasys Controllers - JE			967										967		
Overhaul Circulator Pump, 1 HP, Hot Water - JE	172				172	172									172
Refinish Steel Damper, Motorized										31					
Repair Air Conditioner, Computer Room, Air-Cooled (CRAC), 15.0 Ton			39,181												

All costs expressed in ($) 2019

M&R Cost by Task per Year

JACOBS

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Repair Air Conditioner, Computer Room, Air-Cooled (CRAC), 20.0 Ton															
Repair Air Conditioner, Rooftop, Single Zone, 7.5 Ton			3,278												
Repair Air Conditioner, Window, 1.0 Ton						107									
Repair Air Conditioner, Window, 2.0 Ton	109								109						
Repair Air Handler, Multizone, 10,000 Cfm								2,097							
Repair Air Handler, Multizone, 6,500 Cfm								1,993							
Repair Air Handler, Single Zone, 1,300 Cfm							2,834							2,834	
Repair Air Handler, Single Zone, 2,500 Cfm									2,870					1,435	
Repair Air Handler, Single Zone, 5,000 Cfm			1,475												
Repair Boiler, Gas, 300 Mbh				2,422							2,422				
Repair Boiler, Gas, 750 Mbh				6,118							6,118				
Repair Chiller, Reciprocal, Air-Cooled, 30.0 Ton								22,640							
Repair Circulation Pump, 2 HP, Hot Water - JE			98		98					98	98				
Repair Circulation Pump, Chiller & Condenser Water, 5.000 HP		93						93							
Repair Condenser, Air-Cooled, 10.0 Ton										1,032					
Repair Condenser, Air-Cooled, 15.0 Ton														2,294	
Repair Condenser, Air-Cooled, 20.0 Ton										1,323				2,647	
Repair Condenser, Air-Cooled, 3.0 Ton									1,416					1,416	
Repair Condenser, Air-Cooled, 7.5 Ton														996	
Repair Exhaust Fan, Bathroom 150 cfm - JE						162									
Repair Exhaust Fan, Propeller, 1,000 Cfm															197
Repair Exhaust Fan, Propeller, 20,000 Cfm										342					
Repair Exhaust Fan, Propeller, 375 Cfm															197
Repair Exhaust Fan, Propeller, 800 Cfm								197							
Repair Exhaust Fan, Roof Mounted, 1,500 Cfm								197							
Repair Exhaust Fan, Roof Mounted, 2,000 Cfm					197										
Repair Exhaust Fan, Roof Mounted, 400 Cfm					197										
Repair Exhaust Fan, Roof Mounted, 500 Cfm								197							
Repair Unit Heater, Electric - JE									402						

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Repair Air Conditioner, Computer Room, Air-Cooled (CRAC), 20.0 Ton			49,685												
Repair Air Conditioner, Rooftop, Single Zone, 7.5 Ton					3,278										
Repair Air Conditioner, Window, 1.0 Ton													107		
Repair Air Conditioner, Window, 2.0 Ton								109							
Repair Air Handler, Multizone, 10,000 Cfm											2,097				
Repair Air Handler, Multizone, 6,500 Cfm											1,993				
Repair Air Handler, Single Zone, 1,300 Cfm											2,834				
Repair Air Handler, Single Zone, 2,500 Cfm										2,870					
Repair Air Handler, Single Zone, 5,000 Cfm					1,475										
Repair Boiler, Gas, 300 Mbh			2,422							2,422					
Repair Boiler, Gas, 750 Mbh			6,118							6,118					
Repair Chiller, Reciprocal, Air-Cooled, 30.0 Ton															22,640
Repair Circulation Pump, 2 HP, Hot Water - JE	98			98					98	98					98
Repair Circulation Pump, Chiller & Condenser Water, 5.000 HP			93						93						
Repair Condenser, Air-Cooled, 10.0 Ton												1,032			
Repair Condenser, Air-Cooled, 15.0 Ton															
Repair Condenser, Air-Cooled, 20.0 Ton												1,323			
Repair Condenser, Air-Cooled, 3.0 Ton											1,416				
Repair Condenser, Air-Cooled, 7.5 Ton															
Repair Exhaust Fan, Bathroom 150 cfm - JE										162					
Repair Exhaust Fan, Propeller, 1,000 Cfm															
Repair Exhaust Fan, Propeller, 20,000 Cfm											342				
Repair Exhaust Fan, Propeller, 375 Cfm	197														
Repair Exhaust Fan, Propeller, 800 Cfm												197			
Repair Exhaust Fan, Roof Mounted, 1,500 Cfm												197			
Repair Exhaust Fan, Roof Mounted, 2,000 Cfm											197				
Repair Exhaust Fan, Roof Mounted, 400 Cfm											197				
Repair Exhaust Fan, Roof Mounted, 500 Cfm						197									
Repair Unit Heater, Electric - JE															

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Replace 10' Section Pipe & Fittings, 1" Steel - JE	16												16		
Replace 10' Section Pipe & Fittings, 2" Steel - JE											107				
Replace 10' Section Pipe & Fittings, 2" Steel, Gas - JE	17												17		
Replace 10' Section Pipe & Fittings, 3" Steel - JE		11												11	
Replace 10' Section Pipe & Fittings, 3/4" Steel - JE	20												20		
Replace Air Conditioner, Computer Room, Air-Cooled (CRAC), 15.0 Ton							107,218								
Replace Air Conditioner, Computer Room, Air-Cooled (CRAC), 20.0 Ton							129,328								
Replace Air Conditioner, Rooftop, Single Zone, 7.5 Ton								11,488							
Replace Air Conditioner, Window, 1.0 Ton															
Replace Air Conditioner, Window, 2.0 Ton												1,454			
Replace Air Handler, Multizone, 10,000 Cfm															
Replace Air Handler, Multizone, 6,500 Cfm															
Replace Air Handler, Single Zone, 1,300 Cfm				12,318											
Replace Air Handler, Single Zone, 2,500 Cfm				7,647											15,293
Replace Air Handler, Single Zone, 5,000 Cfm										13,486					
Replace Ball Valve, 2.00 In								1,147							3,441
Replace Boiler, Gas, 300 Mbh															
Replace Boiler, Gas, 750 Mbh															
Replace Calibrated Balancing Valve, 2.00 In												468			
Replace Check Valve, 4.00 In															
Replace Chemical Bypass Pot Feeder - JE															
Replace Chiller, Reciprocal, Air-Cooled, 30.0 Ton															
Replace Circulation Pump, 2 HP, Hot Water - JE						4,707								4,707	
Replace Circulation Pump, Chiller & Condenser Water, 5.000 HP												4,578			
Replace Circulator Pump, 1 HP, Hot Water - JE										8,952	8,952				
Replace Condenser, Air-Cooled, 10.0 Ton															4,781
Replace Condenser, Air-Cooled, 15.0 Ton		13,901													
Replace Condenser, Air-Cooled, 20.0 Ton		20,278													10,139
Replace Condenser, Air-Cooled, 3.0 Ton		3,934												3,934	

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Replace 10' Section Pipe & Fittings, 1" Steel - JE										16					
Replace 10' Section Pipe & Fittings, 2" Steel - JE											107				
Replace 10' Section Pipe & Fittings, 2" Steel, Gas - JE										17					
Replace 10' Section Pipe & Fittings, 3" Steel - JE											11				
Replace 10' Section Pipe & Fittings, 3/4" Steel - JE										20					
Replace Air Conditioner, Computer Room, Air-Cooled (CRAC), 15.0 Ton														107,218	
Replace Air Conditioner, Computer Room, Air-Cooled (CRAC), 20.0 Ton														129,328	
Replace Air Conditioner, Rooftop, Single Zone, 7.5 Ton										11,488					
Replace Air Conditioner, Window, 1.0 Ton		1,313													
Replace Air Conditioner, Window, 2.0 Ton					1,454										
Replace Air Handler, Multizone, 10,000 Cfm	29,663														
Replace Air Handler, Multizone, 6,500 Cfm	19,465														
Replace Air Handler, Single Zone, 1,300 Cfm	12,318							12,318							
Replace Air Handler, Single Zone, 2,500 Cfm								7,647							
Replace Air Handler, Single Zone, 5,000 Cfm														13,486	
Replace Ball Valve, 2.00 In								1,147							3,441
Replace Boiler, Gas, 300 Mbh												9,325			
Replace Boiler, Gas, 750 Mbh												30,931			
Replace Calibrated Balancing Valve, 2.00 In														468	
Replace Check Valve, 4.00 In		2,008	6,023												
Replace Chemical Bypass Pot Feeder - JE			2,146												
Replace Chiller, Reciprocal, Air-Cooled, 30.0 Ton				48,313											
Replace Circulation Pump, 2 HP, Hot Water - JE					4,707								4,707		
Replace Circulation Pump, Chiller & Condenser Water, 5.000 HP														4,578	
Replace Circulator Pump, 1 HP, Hot Water - JE										8,952	8,952				
Replace Condenser, Air-Cooled, 10.0 Ton															
Replace Condenser, Air-Cooled, 15.0 Ton				13,901											
Replace Condenser, Air-Cooled, 20.0 Ton				20,278											
Replace Condenser, Air-Cooled, 3.0 Ton				3,934											

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Replace Condenser, Air-Cooled, 7.5 Ton		3,844													
Replace Controller, Fuel Oil Level - JE															800
Replace Direct Digital Controls, System Points								24,325							
Replace Duct Insulation, Fiberglass - JE				655					4,572						
Replace Ductwork - JE				1,511					10,577						
Replace Exhaust Fan, Bathroom 150 cfm - JE														250	
Replace Exhaust Fan, Propeller, 1,000 Cfm				1,021											
Replace Exhaust Fan, Propeller, 20,000 Cfm															2,673
Replace Exhaust Fan, Propeller, 375 Cfm				549	549										
Replace Exhaust Fan, Propeller, 800 Cfm															
Replace Exhaust Fan, Roof Mounted, 1,500 Cfm															
Replace Exhaust Fan, Roof Mounted, 2,000 Cfm															1,213
Replace Exhaust Fan, Roof Mounted, 400 Cfm															778
Replace Exhaust Fan, Roof Mounted, 500 Cfm										1,006					
Replace Expansion Tank, 100 Gal															
Replace Expansion Tank, 30 Gal															
Replace Expansion Tank, 60 Gal															
Replace Flow Control Valve, Motorized, 2.00 In															
Replace Fuel Tank, 2000 Gal. - JE															
Replace Generator Day Tank, 65 Gal															616
Replace Metasys Controllers - JE								5,715							
Replace Pipe & Fittings, 1" Steel - JE															
Replace Pipe & Fittings, 2" Steel - JE														10,660	
Replace Pipe & Fittings, 2" Steel, Gas - JE															
Replace Pipe & Fittings, 3/4" Steel - JE															
Replace Pipe Insulation, Fiberglass, Chilled Water - JE														1,113	
Replace Pipe Insulation, Fiberglass, Heating Water/Steam - JE			1,933											1,671	
Replace Residential Type Ceiling Fan				716											
Replace Secondary Coil, 288 Sq In															

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Replace Condenser, Air-Cooled, 7.5 Ton				3,844											
Replace Controller, Fuel Oil Level - JE															800
Replace Direct Digital Controls, System Points			24,325										24,325		
Replace Duct Insulation, Fiberglass - JE															
Replace Ductwork - JE															
Replace Exhaust Fan, Bathroom 150 cfm - JE															
Replace Exhaust Fan, Propeller, 1,000 Cfm								1,021							
Replace Exhaust Fan, Propeller, 20,000 Cfm															
Replace Exhaust Fan, Propeller, 375 Cfm								549	549						
Replace Exhaust Fan, Propeller, 800 Cfm	914														
Replace Exhaust Fan, Roof Mounted, 1,500 Cfm	1,177														
Replace Exhaust Fan, Roof Mounted, 2,000 Cfm															
Replace Exhaust Fan, Roof Mounted, 400 Cfm															
Replace Exhaust Fan, Roof Mounted, 500 Cfm														1,006	
Replace Expansion Tank, 100 Gal													2,590		
Replace Expansion Tank, 30 Gal													3,624		
Replace Expansion Tank, 60 Gal													2,154		
Replace Flow Control Valve, Motorized, 2.00 In							3,474								
Replace Fuel Tank, 2000 Gal. - JE									10,137						
Replace Generator Day Tank, 65 Gal															
Replace Metasys Controllers - JE								5,715							
Replace Pipe & Fittings, 1" Steel - JE													1,646		
Replace Pipe & Fittings, 2" Steel - JE															
Replace Pipe & Fittings, 2" Steel, Gas - JE													1,744		
Replace Pipe & Fittings, 3/4" Steel - JE													1,419		
Replace Pipe Insulation, Fiberglass, Chilled Water - JE															
Replace Pipe Insulation, Fiberglass, Heating Water/Steam - JE													1,933		
Replace Residential Type Ceiling Fan								716							
Replace Secondary Coil, 288 Sq In							4,090								

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Replace Thermostat	213				213				427		213				213
Replace Unit Heater, Electric - JE														1,784	
Replace Valve Actuator Flow Control Valve, Motorized, 2.00 In						1,693									
Re-tape Pipe Insulation, Fiberglass, Chilled Water - JE				319					319						
Re-tape Pipe Insulation, Fiberglass, Heating Water/Steam - JE				336				389	336				389		
D40 Fire Protection															
Inspect & Maintain Fire Annunciator Panel - JE	62	62	62	62	62	62	62		62	62	62	62	62	62	62
Inspect & Test Fire Alarm Control Panel	126	126	126	126	126	126	126		126	126	126	126	126	126	126
Inspect & Test Fire Extinguisher	69	69	69	69		69	69	69	69	69	69	69	69	69	69
Inspect & Test Kitchen Fire Suppression System (CO2)	398	398	398	398	398	398	398	398	398	398	398	398		398	398
Maintain, 1 Month Fire Extinguisher	1,044	1,044	1,044	1,044		1,044	1,044	1,044	1,044	1,044	1,044	1,044	1,044	1,044	1,044
Maintain, 12 Month Fire Extinguisher	61	61	61	61		61	61	61	61	61	61	61	61	61	61
Repair Fire Alarm Control Panel			95										95		
Replace Fire Alarm Control Panel								2,842							
Replace Fire Annunciator Panel - JE								1,778							
Replace Fire Extinguisher					6,689										
Replace Kitchen Fire Suppression System (CO2)													2,441		
D50 Electrical															
Annual PM Circuit Breaker, 15/20 Amp. - JE	179	179	179	179	175	159	179	178	173	179	179	179	156	179	128
Annual PM Uninterruptible Power Supply, 100 KW - JE	1,593	1,593	1,593	1,593	1,593	1,593	1,593	1,593	1,593	1,593	1,593	1,593		1,593	1,593
Annual PM UPS Battery - JE	1,771	1,771	1,771	1,771		1,771	1,771	1,771	1,771	1,771	1,771	1,771	1,771	1,771	
Check & Adjust Manual Pull Station			706												
Check Operation Smoke Detector, Duct	120	120	120	120	120	120	120		120	120	120	120	120	120	120
Clean Terminals, Check Water & Test Generator Battery, Wet, 1 V	39	39	39	39	39	39	39	39		39	39	39	39	39	39
Electrical Testing Generator, Diesel, 300 kW	468	468	468	468	468	468	468	468	468		468	468	468	468	468
Inspect & Clean Motor Starter, 10.000 HP, 208 V	41	41	41	41	41	41	41	41	41	41	41	41		41	41
Inspect & Clean Motor Starter, 2.000 HP, 208 V	288	288	247	288	288	288	288	288	288	288	288	288	288	41	288
Inspect & Clean Transfer Switch, Auto, 600 V, 600 Amp	468	468		468	468	468	468	468	468	468	468	468	468	468	468
Inspect & Maintain Control Panel, Load Bank - JE	98	98	98	98	98	98	98	98	98	98	98	98	49	98	49

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Replace Thermostat				427		213				213				427	
Replace Unit Heater, Electric - JE														1,784	
Replace Valve Actuator Flow Control Valve, Motorized, 2.00 In					1,693										
Re-tape Pipe Insulation, Fiberglass, Chilled Water - JE				319					319					319	
Re-tape Pipe Insulation, Fiberglass, Heating Water/Steam - JE			389	336				389	336					336	
D40 Fire Protection															
Inspect & Maintain Fire Annunciator Panel - JE	62	62	62	62	62	62	62		62	62	62	62	62	62	62
Inspect & Test Fire Alarm Control Panel	126	126	126	126	126	126	126		126	126	126	126	126	126	126
Inspect & Test Fire Extinguisher	69		69	69	69	69	69	69	69	69	69	69	69		69
Inspect & Test Kitchen Fire Suppression System (CO2)	398	398	398	398	398	398	398	398	398	398	398	398	398	398	398
Maintain, 1 Month Fire Extinguisher	1,044		1,044	1,044	1,044	1,044	1,044	1,044	1,044	1,044	1,044	1,044	1,044		1,044
Maintain, 12 Month Fire Extinguisher	61		61	61	61	61	61	61	61	61	61	61	61		61
Repair Fire Alarm Control Panel			95										95		
Replace Fire Alarm Control Panel								2,842							
Replace Fire Annunciator Panel - JE								1,778							
Replace Fire Extinguisher		6,689												6,689	
Replace Kitchen Fire Suppression System (CO2)															
D50 Electrical															
Annual PM Circuit Breaker, 15/20 Amp. - JE	179	179	179	179	179	179	179	179	179	179	179	179	179	108	176
Annual PM Uninterruptible Power Supply, 100 KW - JE	1,593	1,593	1,593	1,593	1,593	1,593	1,593	1,593	1,593	1,593	1,593	1,593		1,593	1,593
Annual PM UPS Battery - JE	1,771	1,771	1,771	1,771	1,771	1,771	1,771	1,771	1,771		1,771	1,771	1,771	1,771	1,771
Check & Adjust Manual Pull Station			706												
Check Operation Smoke Detector, Duct	120	120	120	120	120	120	120		120	120	120	120	120	120	120
Clean Terminals, Check Water & Test Generator Battery, Wet, 1 V	39	39	39		39	39	39	39	39	39	39	39	39		39
Electrical Testing Generator, Diesel, 300 kW	468	468	468	468	468	468	468	468	468	468	468	468	468	468	468
Inspect & Clean Motor Starter, 10.000 HP, 208 V	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41
Inspect & Clean Motor Starter, 2.000 HP, 208 V	288	288	288	288	288	247	288	288	288	288	288	288	288	288	288
Inspect & Clean Transfer Switch, Auto, 600 V, 600 Amp	468	468	468	468	468		468	468	468	468	468	468	468	468	468
Inspect & Maintain Control Panel, Load Bank - JE	98	98	98	98	98	98	98	98	98	98	98	98	49	98	49

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Inspect & Maintain Security Control Panel	1,416	1,416	1,416	1,416	1,416	1,416	1,416	1,416	1,416	1,416	1,416	1,416	1,416	1,416	
Maintain & Repair General Wiring Lightning Protection - JE	79	79	79	79	79	79	79	79	79	79	79	79	79	64	79
Maintain Card Reader	4,957	4,957	4,957	4,957		4,957	4,957	4,957	4,957	4,957	4,957	4,957	4,957	4,957	
Maintain Circuit Breaker, 3 Ph., 600 V, 100 Amp	1,656	1,656	1,656	1,656	1,656	1,567	1,656	1,656	1,656	1,656	1,656	1,656	1,597	1,656	975
Maintain Circuit Breaker, 3 Ph., 600 V, 60 Amp	3,573	3,573	3,573	3,573	3,484	3,514	3,573	3,366	3,573	3,573	3,573	3,573	3,573	3,573	3,100
Maintain Circuit Breaker, 600 V, 400 Amp	1,449	1,449	1,449	1,449	1,419	1,449	1,449	1,449	1,449	1,449	1,449	1,449	1,272	1,449	858
Maintain Circuit Breaker, Main, 208 Y, 120 V, 1,200 Amp	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Maintain Circuit Breaker, Main, 208 Y, 120 V, 600 Amp	59	59	59	59	59	59	59	59	59	59	59	59	59	59	
Maintain Circuit Breaker, Main, 208 Y, 120 V, 800 Amp	30	30	30	30	30	30	30	30	30	30	30	30	30	30	
Maintain Disconnect Switch, 100 Amp	481	481	481	481	481	481	481	481	481	481	481	481	481	481	481
Maintain Disconnect Switch, 200 Amp	344	344	344	344	344	344	344	344	344	344	344	344	344	344	344
Maintain Disconnect Switch, 30 Amp	549	549	549	549	549	549	549	549	549	549	549	549	549	549	549
Maintain Disconnect Switch, 60 Amp	413	413	413	413	413	413	413	413	413	413	413	413	413	413	413
Maintain Disconnect Switch, 600 Amp	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69
Maintain Intercom Speaker	90	90	90	90		90	90	90	90	90	90	90	90	90	90
Maintain Intrusion Detection Motion Detector, Interior	119	119	119	119		119	119	119	119	119	119	119	119	119	
Maintain Load Bank, 300 KW - JE	30	30	30	30	30	30	30	30	30	30	30	30	30	30	
Maintain Motion Sensing Wall Switch	4	4	4	4		4	4	4	4	4	4	4	4	4	
Maintain Power Panel Board, 208 Y, 120 V, 1,200 Amp	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39
Maintain Power Panel Board, 208 Y, 120 V, 100 Amp	1,034	1,034	1,034	1,034	965	1,034	1,034	896	965	1,034	1,034	1,034	1,034	1,034	690
Maintain Power Panel Board, 208 Y, 120 V, 200 Amp	276	276	276	276	207	276	276	276	276	276	276	276	138	276	207
Maintain Power Panel Board, 208 Y, 120 V, 225 Amp	826	826	826	826	826	689	826	826	757	826	826	826	757	826	620
Maintain Power Panel Board, 208 Y, 120 V, 400 Amp	412	412	412	412	412	412	412	412	412	412	412	412	274	412	275
Maintain Power Panel Board, 208 Y, 120 V, 600 Amp	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39
Maintain Power Panel Board, 208 Y, 120 V, 800 Amp	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78
Maintain Power Panel Board, 480 Y, 277 V, 200 Amp	69	69	69	69	69	69	69	69	69	69	69	69	69	69	
Maintain Power Panel Board, 480 Y, 277 V, 600 Amp	78	78	78	78	78	78	78	78	78	78	78	78	78	78	
Maintain Power Panel Board, 480 Y, 277 V, 800 Amp	39	39	39	39	39	39	39	39	39	39	39	39	39	39	
Maintain Public Address Speaker	90	90	90	90	90	90	90	90	90	90	90	90	90	90	

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Inspect & Maintain Security Control Panel	1,416	1,416	1,416	1,416	1,416	1,416	1,416	1,416	1,416	1,416	1,416	1,416	1,416	1,416	
Maintain & Repair General Wiring Lightning Protection - JE	79	79	79	69	79	79	25	79	79	79	79	79	79	79	79
Maintain Card Reader	4,957	4,957	4,957	4,957	4,957	4,957	4,957	4,957	4,957		4,957	4,957	4,957	4,957	4,957
Maintain Circuit Breaker, 3 Ph., 600 V, 100 Amp	1,656	1,656	1,656	1,567	1,656	1,656	1,656	1,656	1,656	1,656	1,656	1,656	1,656	1,656	1,656
Maintain Circuit Breaker, 3 Ph., 600 V, 60 Amp	3,573	3,573	3,573	3,278	3,573	3,573	3,573	3,573	3,573	3,573	3,573	3,573	3,573	3,573	3,573
Maintain Circuit Breaker, 600 V, 400 Amp	1,449	1,449	1,449	1,390	1,449	1,449	1,449	1,449	1,449	1,449	1,449	1,449	1,449	1,449	1,449
Maintain Circuit Breaker, Main, 208 Y, 120 V, 1,200 Amp	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Maintain Circuit Breaker, Main, 208 Y, 120 V, 600 Amp	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59
Maintain Circuit Breaker, Main, 208 Y, 120 V, 800 Amp	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Maintain Disconnect Switch, 100 Amp	481	481	481	481	481	481	481	481	481	481	481	481	412	481	481
Maintain Disconnect Switch, 200 Amp	344	344	344	344	207	344	344	344	344	344	344	344	275	344	344
Maintain Disconnect Switch, 30 Amp	549	549	549	549	549	549	549	549	549	549	549	549	549	549	549
Maintain Disconnect Switch, 60 Amp	413	413	413	413	413	413	413	413	413	413	413	413	344	413	413
Maintain Disconnect Switch, 600 Amp	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69
Maintain Intercom Speaker	90	90	90	90	90	90	90	90	90		90	90	90	90	90
Maintain Intrusion Detection Motion Detector, Interior	119	119	119	119	119	119	119	119	119		119	119	119	119	119
Maintain Load Bank, 300 KW - JE	30	30	30	30	30	30	30	30	30	30	30	30	30	30	
Maintain Motion Sensing Wall Switch	4	4	4	4	4	4	4	4	4		4	4	4	4	4
Maintain Power Panel Board, 208 Y, 120 V, 1,200 Amp	39	39	39	39	39	39	39	39	39	39	39	39	39	39	
Maintain Power Panel Board, 208 Y, 120 V, 100 Amp	1,034	1,034	1,034	1,034	1,034	1,034	1,034	1,034	1,034	1,034	1,034	1,034	1,034	620	1,034
Maintain Power Panel Board, 208 Y, 120 V, 200 Amp	276	276	276	276	276	276	276	276	276	276	276	276	276	276	276
Maintain Power Panel Board, 208 Y, 120 V, 225 Amp	826	826	826	826	826	826	826	826	826	826	826	826	826	550	757
Maintain Power Panel Board, 208 Y, 120 V, 400 Amp	412	412	412	412	412	412	412	412	412	412	412	412	412	412	275
Maintain Power Panel Board, 208 Y, 120 V, 600 Amp	39	39	39	39	39	39	39	39	39	39	39	39	39		39
Maintain Power Panel Board, 208 Y, 120 V, 800 Amp	78	78	78	78	78	78	78	78	78	78	78	78	78		78
Maintain Power Panel Board, 480 Y, 277 V, 200 Amp	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69
Maintain Power Panel Board, 480 Y, 277 V, 600 Amp	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78
Maintain Power Panel Board, 480 Y, 277 V, 800 Amp	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39
Maintain Public Address Speaker	90	90	90	90	90	90	90	90	90	90	90	90	90	90	

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Maintain Secondary Transformer, Dry, 15 kVA	108	108	108	108	108	108	108	108	108	108	108	108	108	108	
Maintain Secondary Transformer, Dry, 150 kVA	234	234	234	234	234	234	234	234	234	234	234	234	234	234	78
Maintain Secondary Transformer, Dry, 30 kVA	324	324	324	324	324	324	324	324	324	324	324	324	324	324	
Maintain Transient Voltage Surge Suppression Panel	234	234	234	234	234	234	234	234	234	234	234	234	234	234	52
Maintain, 1 Month Generator, Diesel, 300 kW	708	708	708	708	708	708	708	708	708		708	708	708	708	708
Maintain, 12 Month Camera, Exterior, Closed Circuit, Fixed Color	107	107	107	107		107	107	107	107	107	107	107	107	107	
Maintain, 12 Month Camera, Interior, Closed Circuit, Fixed Color	321	321	321	321		321	321	321	321	321	321	321	321	321	
Maintain, 12 Month Generator, Diesel, 300 kW	6	6	6	6	6	6	6	6	6		6	6	6	6	6
Maintain, 12 Month Heat Detector	20	20	20	20	20	20	20		20	20	20	20	20	20	20
Maintain, 12 Month Power Panel Board, 208 Y, 120 V, 1,200 Amp	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82
Maintain, 12 Month Power Panel Board, 208 Y, 120 V, 600 Amp	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82
Maintain, 12 Month Power Panel Board, 208 Y, 120 V, 800 Amp	163	163	163	163	163	163	163	163	163	163	163	163	163	163	163
Maintain, 12 Month Power Panel Board, 480 Y, 277 V, 600 Amp	163	163	163	163	163	163	163	163	163	163	163	163	163	163	
Maintain, 12 Month Power Panel Board, 480 Y, 277 V, 800 Amp	82	82	82	82	82	82	82	82	82	82	82	82	82	82	
Maintain, 12 Month Secondary Transformer, Dry, 150 kVA	234	234	234	234	234	234	234	234	234	234	234	234	234	234	78
Maintain, 12 Month Transfer Switch, Auto, 600 V, 600 Amp	166	166		166	166	166	166	166	166	166	166	166	166	166	166
Maintain, 36 Month Secondary Transformer, Dry, 150 kVA			66			66			66			66			22
Maintain, 6 Month Generator, Diesel, 300 kW	336	336	336	336	336	336	336	336	336		336	336	336	336	336
Maintain, 6 Month Load Bank, 200 kW	194	194	194	194	194	194	194	194	194	194	194	194	194	194	194
Minor Repair Control Panel, Load Bank - JE			200		200			200		200					
Repair Battery Charger	160		160				160		160		160		160		160
Repair Circuit Breaker, 15/20 Amp. - JE			616		1,348				1,878	78					94
Repair Circuit Breaker, 3 Ph., 600 V, 100 Amp			1,762		10,578				8,373	2,644			881		441
Repair Circuit Breaker, 3 Ph., 600 V, 60 Amp			3,085		7,051				37,900				3,085		1,322
Repair Circuit Breaker, 600 V, 400 Amp			3,085		8,814				5,729	3,526			441		441
Repair Circuit Breaker, Main, 208 Y, 120 V, 1,200 Amp										534					
Repair Circuit Breaker, Main, 208 Y, 120 V, 600 Amp					1,068										
Repair Circuit Breaker, Main, 208 Y, 120 V, 800 Amp					534										
Repair Disconnect Switch, 100 Amp					602			100							602

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Maintain Secondary Transformer, Dry, 15 kVA	108	108	108	108	108	108	108	108	108	108	108	108	108	108	108
Maintain Secondary Transformer, Dry, 150 kVA	234	234	234	234	234	234	234	234	234	234	234	234	234	234	156
Maintain Secondary Transformer, Dry, 30 kVA	324	324	324	324	324	324	324	324	324	324	324	324	324	324	324
Maintain Transient Voltage Surge Suppression Panel	234	234	234	234	234	234	208	234	234	234	234	234	234	234	208
Maintain, 1 Month Generator, Diesel, 300 kW	708	708	708	708	708	708	708	708	708	708	708	708	708	708	708
Maintain, 12 Month Camera, Exterior, Closed Circuit, Fixed Color	107	107	107	107	107	107	107	107	107		107	107	107	107	107
Maintain, 12 Month Camera, Interior, Closed Circuit, Fixed Color	321	321	321	321	321	321	321	321	321		321	321	321	321	321
Maintain, 12 Month Generator, Diesel, 300 kW	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Maintain, 12 Month Heat Detector	20	20	20	20	20	20	20		20	20	20	20	20	20	20
Maintain, 12 Month Power Panel Board, 208 Y, 120 V, 1,200 Amp	82	82	82	82	82	82	82	82	82	82	82	82	82	82	
Maintain, 12 Month Power Panel Board, 208 Y, 120 V, 600 Amp	82	82	82	82	82	82	82	82	82	82	82	82	82		82
Maintain, 12 Month Power Panel Board, 208 Y, 120 V, 800 Amp	163	163	163	163	163	163	163	163	163	163	163	163	163		163
Maintain, 12 Month Power Panel Board, 480 Y, 277 V, 600 Amp	163	163	163	163	163	163	163	163	163	163	163	163	163	163	163
Maintain, 12 Month Power Panel Board, 480 Y, 277 V, 800 Amp	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82
Maintain, 12 Month Secondary Transformer, Dry, 150 kVA	234	234	234	234	234	234	234	234	234	234	234	234	234	234	156
Maintain, 12 Month Transfer Switch, Auto, 600 V, 600 Amp	166	166	166	166	166		166	166	166	166	166	166	166	166	166
Maintain, 36 Month Secondary Transformer, Dry, 150 kVA			66			66			66			66			44
Maintain, 6 Month Generator, Diesel, 300 kW	336	336	336	336	336	336	336	336	336	336	336	336	336	336	336
Maintain, 6 Month Load Bank, 200 kW	194	194	194	194	194	194	194	194	194		194	194	194	194	194
Minor Repair Control Panel, Load Bank - JE			200		200			200		200					
Repair Battery Charger		160		160		160		160				160		160	
Repair Circuit Breaker, 15/20 Amp. - JE	530		23	2,034	78			616		1,442	530		23	156	
Repair Circuit Breaker, 3 Ph., 600 V, 100 Amp	1,322			7,051	2,644			1,762		10,578	1,322			8,373	2,644
Repair Circuit Breaker, 3 Ph., 600 V, 60 Amp	881		3,085	33,493				3,085		8,373	881		3,085	37,900	
Repair Circuit Breaker, 600 V, 400 Amp				4,848	3,526			3,085		9,255				5,729	3,526
Repair Circuit Breaker, Main, 208 Y, 120 V, 1,200 Amp					534										534
Repair Circuit Breaker, Main, 208 Y, 120 V, 600 Amp										1,068					
Repair Circuit Breaker, Main, 208 Y, 120 V, 800 Amp										534					
Repair Disconnect Switch, 100 Amp			100							602					

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Repair Disconnect Switch, 200 Amp					106		106	106		212					106
Repair Disconnect Switch, 30 Amp					575		82								575
Repair Disconnect Switch, 60 Amp					259			86	172						259
Repair Disconnect Switch, 600 Amp					184										184
Repair Heat Detector			32												
Repair Power Panel Board, 208 Y, 120 V, 1,200 Amp										68					
Repair Power Panel Board, 208 Y, 120 V, 100 Amp					341				408						68
Repair Power Panel Board, 208 Y, 120 V, 200 Amp			136		68										68
Repair Power Panel Board, 208 Y, 120 V, 225 Amp			68		205				272	68					
Repair Power Panel Board, 208 Y, 120 V, 400 Amp			136		137					137					
Repair Power Panel Board, 208 Y, 120 V, 600 Amp									68						
Repair Power Panel Board, 208 Y, 120 V, 800 Amp									137						
Repair Power Panel Board, 480 Y, 277 V, 200 Amp					68										
Repair Power Panel Board, 480 Y, 277 V, 600 Amp					206										
Repair Power Panel Board, 480 Y, 277 V, 800 Amp					103										
Repair Secondary Transformer, Dry, 15 kVA					319										
Repair Secondary Transformer, Dry, 150 kVA					638					319					
Repair Secondary Transformer, Dry, 30 kVA					957										
Repair Security Control Panel					1,627					1,627					
Repair Smoke Detector			1,705												
Repair Smoke Detector, Duct			235												
Repair Transfer Switch, Auto, 600 V, 600 Amp								193					193		
Repair Wiring Device, Switch			2,188		143				1,117						
Replace Ballast & Lamp Compact Fluorescent Lighting Fixture, Digital Addressable Ballast, 32 W															2,217
Replace Ballast & Lamp High Pressure Sodium Lighting Fixture, 250 W									239						
Replace Ballast & Lamps Fluorescent Lighting Fixture, T12, 40 W			1,540						840						
Replace Ballast & Lamps Fluorescent Lighting Fixture, T12, 60 W									1,421						
Replace Ballast & Lamps Fluorescent Lighting Fixture, T8, 25 W															1,695
Replace Ballast & Lamps Fluorescent Lighting Fixture, T8, 32 W															6,349

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Repair Disconnect Switch, 200 Amp		106	106							106		106			212
Repair Disconnect Switch, 30 Amp		82								575		82			
Repair Disconnect Switch, 60 Amp			86	172						259				172	
Repair Disconnect Switch, 600 Amp										184					
Repair Heat Detector			32												
Repair Power Panel Board, 208 Y, 120 V, 1,200 Amp					68										
Repair Power Panel Board, 208 Y, 120 V, 100 Amp			136	476						409			136	68	
Repair Power Panel Board, 208 Y, 120 V, 200 Amp								136		136					
Repair Power Panel Board, 208 Y, 120 V, 225 Amp	137			340	68			68		205	137			68	
Repair Power Panel Board, 208 Y, 120 V, 400 Amp					137			136		137					
Repair Power Panel Board, 208 Y, 120 V, 600 Amp				68											
Repair Power Panel Board, 208 Y, 120 V, 800 Amp				137											
Repair Power Panel Board, 480 Y, 277 V, 200 Amp										68					
Repair Power Panel Board, 480 Y, 277 V, 600 Amp										206					
Repair Power Panel Board, 480 Y, 277 V, 800 Amp										103					
Repair Secondary Transformer, Dry, 15 kVA										319					
Repair Secondary Transformer, Dry, 150 kVA					319					638					
Repair Secondary Transformer, Dry, 30 kVA										957					
Repair Security Control Panel					1,627					1,627					
Repair Smoke Detector			1,705												
Repair Smoke Detector, Duct			235												
Repair Transfer Switch, Auto, 600 V, 600 Amp			193								193				
Repair Wiring Device, Switch								2,188	1,117	143					
Replace Ballast & Lamp Compact Fluorescent Lighting Fixture, Digital Addressable Ballast, 32 W															
Replace Ballast & Lamp High Pressure Sodium Lighting Fixture, 250 W														239	
Replace Ballast & Lamps Fluorescent Lighting Fixture, T12, 40 W				840				1,540						840	
Replace Ballast & Lamps Fluorescent Lighting Fixture, T12, 60 W				224										1,421	
Replace Ballast & Lamps Fluorescent Lighting Fixture, T8, 25 W															
Replace Ballast & Lamps Fluorescent Lighting Fixture, T8, 32 W															

All costs expressed in ($) 2019

M&R Cost by Task per Year

JACOBS

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Replace Ballast Metal Halide Lighting Fixture, Wall Mount, 150 W									146						
Replace Batteries & Check Operation Smoke Detector	748	748	748	748	748	748	748		748	748	748	748	748	748	748
Replace Battery Charger					1,209										
Replace Camera, Exterior, Closed Circuit, Fixed Color					3,283										3,283
Replace Camera, Interior, Closed Circuit, Fixed Color					5,318										5,318
Replace Card Reader					4,332										4,332
Replace Circuit Breaker, 15/20 Amp. - JE					360	2,036		90	599				2,366		5,181
Replace Circuit Breaker, 3 Ph., 600 V, 100 Amp						3,980							2,653		30,513
Replace Circuit Breaker, 3 Ph., 600 V, 60 Amp					3,608	2,406		8,419							19,245
Replace Circuit Breaker, 600 V, 400 Amp					4,274								25,645		85,484
Replace Circuit Breaker, Main, 208 Y, 120 V, 600 Amp															18,721
Replace Circuit Breaker, Main, 208 Y, 120 V, 800 Amp															9,882
Replace Coil Motor Starter, 10.000 HP, 208 V	217			217			217			217					
Replace Coil Motor Starter, 2.000 HP, 208 V		1,278			1,278	213		1,278	213		1,278	213			213
Replace Compact Fluorescent Lighting Fixture, Digital Addressable Ballast, 32 W					1,036										
Replace Control Panel, Load Bank - JE													2,427		2,427
Replace Disconnect Switch, 100 Amp															
Replace Disconnect Switch, 200 Amp															
Replace Disconnect Switch, 60 Amp															
Replace Electronic Lock					1,279										1,279
Replace Elements Load Bank, 300 KW - JE					336										
Replace Emergency Lighting Pack, 2 Light w/ Battery					5,556				1,852						
Replace Exit Lighting Fixture, LED					1,193										
Replace Fire Alarm Horn & Strobe													6,749		
Replace Fluorescent Lighting Fixture, T12, 40 W									1,872				3,432		
Replace Fluorescent Lighting Fixture, T12, 60 W									468						
Replace Fluorescent Lighting Fixture, T8, 25 W					3,744										
Replace Fluorescent Lighting Fixture, T8, 32 W					12,480										
Replace Generator Battery, Wet, 1 V									947						

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Replace Ballast Metal Halide Lighting Fixture, Wall Mount, 150 W														146	
Replace Batteries & Check Operation Smoke Detector	748	748	748	748	748	748	748		748	748	748	748	748	748	748
Replace Battery Charger										1,209					
Replace Camera, Exterior, Closed Circuit, Fixed Color										3,283					
Replace Camera, Interior, Closed Circuit, Fixed Color										5,318					
Replace Card Reader										4,332					
Replace Circuit Breaker, 15/20 Amp. - JE														7,216	299
Replace Circuit Breaker, 3 Ph., 600 V, 100 Amp				3,980											
Replace Circuit Breaker, 3 Ph., 600 V, 60 Amp				12,028											
Replace Circuit Breaker, 600 V, 400 Amp				8,548											
Replace Circuit Breaker, Main, 208 Y, 120 V, 600 Amp															
Replace Circuit Breaker, Main, 208 Y, 120 V, 800 Amp															
Replace Coil Motor Starter, 10.000 HP, 208 V	217			217			217			217			217		
Replace Coil Motor Starter, 2.000 HP, 208 V		1,278	213		1,278			1,278	213		1,278	213		1,278	213
Replace Compact Fluorescent Lighting Fixture, Digital Addressable Ballast, 32 W										1,036					
Replace Control Panel, Load Bank - JE													2,427		2,427
Replace Disconnect Switch, 100 Amp													1,511		
Replace Disconnect Switch, 200 Amp					2,967								1,484		
Replace Disconnect Switch, 60 Amp													747		
Replace Electronic Lock										1,279					
Replace Elements Load Bank, 300 KW - JE										336					
Replace Emergency Lighting Pack, 2 Light w/ Battery			2,778							5,556				1,852	
Replace Exit Lighting Fixture, LED										1,193					
Replace Fire Alarm Horn & Strobe															
Replace Fluorescent Lighting Fixture, T12, 40 W				1,872										1,872	
Replace Fluorescent Lighting Fixture, T12, 60 W				2,964										468	
Replace Fluorescent Lighting Fixture, T8, 25 W										3,744					
Replace Fluorescent Lighting Fixture, T8, 32 W										12,480					
Replace Generator Battery, Wet, 1 V				947										947	

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Replace Generator, Diesel, 300 kW										135,975					
Replace Grounded Fault Circuit Interrupter, 15 Amp					404				58		173				115
Replace Halogen Lighting Fixture, 100 W													219		
Replace Heat Detector								121							
Replace High Pressure Sodium Lighting Fixture, 250 W															
Replace Incandescent Lighting Fixture, Basic, 100 W					1,371				686				1,508		
Replace Intercom Speaker					1,326										
Replace Intrusion Detection Motion Detector, Interior					2,288										2,288
Replace Lamp Emergency Lighting Pack, 2 Light w/ Battery	429	429	429	429	195	429	429	429	351	429	429	429	429	429	429
Replace Lamp Halogen Lighting Fixture, 100 W			19					19							
Replace Lamp Incandescent Lighting Fixture, Basic, 100 W			76	296				76	262	69				296	69
Replace Lamp LED Lighting Fixture, Basic, 11 W							38								
Replace Lamp LED Lighting Fixture, Basic, 20 W							45								
Replace Lamp Metal Halide Lighting Fixture, Wall Mount, 150 W				65					65					65	
Replace LED Lighting Fixture, Basic, 11 W															
Replace LED Lighting Fixture, Basic, 20 W															
Replace LED Obstruction Light - JE															
Replace Lens Emergency Lighting Pack, 2 Light w/ Battery								70							139
Replace Lightning Protection - JE														623	
Replace Load Bank, 200 kW															
Replace Load Bank, 300 KW - JE															10,363
Replace Manual Pull Station								1,589							
Replace Metal Halide Lighting Fixture, Wall Mount, 150 W															
Replace Monitor, Medium, Closed Circuit					3,272										3,272
Replace Motion Sensing Wall Switch					93										93
Replace Motor Starter, 10.000 HP, 208 V													1,631		
Replace Motor Starter, 2.000 HP, 208 V			683											4,099	
Replace Power Panel Board, 208 Y, 120 V, 1,200 Amp															
Replace Power Panel Board, 208 Y, 120 V, 100 Amp					3,809			7,618	3,809						19,045

All costs expressed in ($) 2019

M&R Cost by Task per Year

JACOBS

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Replace Generator, Diesel, 300 kW															
Replace Grounded Fault Circuit Interrupter, 15 Amp										404				58	
Replace Halogen Lighting Fixture, 100 W															
Replace Heat Detector								121							
Replace High Pressure Sodium Lighting Fixture, 250 W				1,462											
Replace Incandescent Lighting Fixture, Basic, 100 W				5,210						1,371				686	
Replace Intercom Speaker										1,326					
Replace Intrusion Detection Motion Detector, Interior										2,288					
Replace Lamp Emergency Lighting Pack, 2 Light w/ Battery	429	429	312	429	429	429	429	429	429	195	429	429	429	351	429
Replace Lamp Halogen Lighting Fixture, 100 W			19					19					19		
Replace Lamp Incandescent Lighting Fixture, Basic, 100 W			76	34	69			76	296				76	262	69
Replace Lamp LED Lighting Fixture, Basic, 11 W												38			
Replace Lamp LED Lighting Fixture, Basic, 20 W												45			
Replace Lamp Metal Halide Lighting Fixture, Wall Mount, 150 W									65					65	
Replace LED Lighting Fixture, Basic, 11 W		286													
Replace LED Lighting Fixture, Basic, 20 W		143													
Replace LED Obstruction Light - JE				1,529											
Replace Lens Emergency Lighting Pack, 2 Light w/ Battery				46									70		
Replace Lightning Protection - JE				433			2,315								
Replace Load Bank, 200 kW										16,413					
Replace Load Bank, 300 KW - JE															10,363
Replace Manual Pull Station								1,589							
Replace Metal Halide Lighting Fixture, Wall Mount, 150 W				429											
Replace Monitor, Medium, Closed Circuit										3,272					
Replace Motion Sensing Wall Switch										93					
Replace Motor Starter, 10.000 HP, 208 V															
Replace Motor Starter, 2.000 HP, 208 V						683									
Replace Power Panel Board, 208 Y, 120 V, 1,200 Amp															11,826
Replace Power Panel Board, 208 Y, 120 V, 100 Amp														22,854	

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Replace Power Panel Board, 208 Y, 120 V, 200 Amp					5,199								10,398		5,199
Replace Power Panel Board, 208 Y, 120 V, 225 Amp						12,292			6,146				6,146		18,439
Replace Power Panel Board, 208 Y, 120 V, 400 Amp													14,588		14,588
Replace Power Panel Board, 208 Y, 120 V, 600 Amp															
Replace Power Panel Board, 208 Y, 120 V, 800 Amp															
Replace Power Panel Board, 480 Y, 277 V, 200 Amp															6,861
Replace Power Panel Board, 480 Y, 277 V, 600 Amp															19,421
Replace Power Panel Board, 480 Y, 277 V, 800 Amp															11,017
Replace Public Address Speaker															1,850
Replace Receptacle, 120 V, 20 Amp					881				294				10,220		
Replace Remote Door Release System - JE								9,877							
Replace Secondary Transformer, Dry, 15 kVA															3,605
Replace Secondary Transformer, Dry, 150 kVA															23,718
Replace Secondary Transformer, Dry, 30 kVA															13,707
Replace Security Control Panel															24,466
Replace Smoke Detector								7,342							
Replace Smoke Detector, Duct								3,368							
Replace Transfer Switch, Auto, 600 V, 600 Amp			12,920												
Replace Transient Voltage Surge Suppression Panel															4,218
Replace Uninterruptible Power Supply, 100 KW - JE													60,478		
Replace UPS Battery - JE					16,630										16,630
Replace Wiring Device, Switch													2,473	1,263	161
E10 Equipment															
Annual PM Central Vacuum System - JE	89	89	89	89	89	89	89	89	89	89	89	89	89	89	
Maintain Kitchen Exhaust Hood, Domestic - JE	78	78	78	78	78	78	78	78	78	78	78	78	78	78	
Maintain Refrigerator, Mini, 3 Cu Ft	28	28	28	28		28	28	28	28	28	28	28	28	28	
Maintain, 12 Month Kitchen Exhaust Hood, Commercial	57	57	57	57	57	57	57	57	57	57	57	57	57	57	
Maintain, 6 Month Cooking Range, Commercial	230	230	230	230		230	230	230	230	230	230	230	230	230	
Maintain, 6 Month Dishwasher, Electric	972	972	972	972		972	972	972	972	972	972	972	972	972	

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Replace Power Panel Board, 208 Y, 120 V, 200 Amp															
Replace Power Panel Board, 208 Y, 120 V, 225 Amp														24,584	6,146
Replace Power Panel Board, 208 Y, 120 V, 400 Amp															14,588
Replace Power Panel Board, 208 Y, 120 V, 600 Amp														8,427	
Replace Power Panel Board, 208 Y, 120 V, 800 Amp														19,119	
Replace Power Panel Board, 480 Y, 277 V, 200 Amp															
Replace Power Panel Board, 480 Y, 277 V, 600 Amp															
Replace Power Panel Board, 480 Y, 277 V, 800 Amp															
Replace Public Address Speaker															1,850
Replace Receptacle, 120 V, 20 Amp				5,991						881				294	
Replace Remote Door Release System - JE								9,877							
Replace Secondary Transformer, Dry, 15 kVA															
Replace Secondary Transformer, Dry, 150 kVA															11,859
Replace Secondary Transformer, Dry, 30 kVA															
Replace Security Control Panel															24,466
Replace Smoke Detector								7,342							
Replace Smoke Detector, Duct								3,368							
Replace Transfer Switch, Auto, 600 V, 600 Amp						12,920									
Replace Transient Voltage Surge Suppression Panel							603								603
Replace Uninterruptible Power Supply, 100 KW - JE													60,478		
Replace UPS Battery - JE										16,630					
Replace Wiring Device, Switch													2,473	1,263	161
E10 Equipment															
Annual PM Central Vacuum System - JE	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89
Maintain Kitchen Exhaust Hood, Domestic - JE	78	78	78	78	78	78	78	78	78	78	78	78	78	78	
Maintain Refrigerator, Mini, 3 Cu Ft	28	28	28	28	28	28	28	28	28		28	28	28	28	28
Maintain, 12 Month Kitchen Exhaust Hood, Commercial	57	57	57	57	57	57	57	57	57	57	57	57	57	57	
Maintain, 6 Month Cooking Range, Commercial	230	230	230	230	230	230	230	230	230		230	230	230	230	230
Maintain, 6 Month Dishwasher, Electric	972	972	972	972	972	972	972	972	972		972	972	972	972	972

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Maintain, 6 Month Disposal, Garbage, Electric	384	384	384	384		384	384	384	384	384	384	384	384	384	
Maintain, 6 Month Kitchen Exhaust Hood, Commercial	192	192	192	192	192	192	192	192	192	192	192	192	192	192	
Maintain, 6 Month Range/Oven	654	654	654	654	218	654	654	654	436	654	654	654	654	654	218
Replace Central Vacuum System - JE															3,602
Replace Cooking Range, Commercial					2,322										2,322
Replace Dishwasher, Electric					10,518										10,518
Replace Disposal, Garbage, Electric					1,202										1,202
Replace Kitchen Cabinet, Wood - JE					14,510										14,510
Replace Kitchen Exhaust Hood, Commercial															6,005
Replace Kitchen Exhaust Hood, Domestic - JE															962
Replace Microwave Oven					238										238
Replace Range/Oven					9,188				4,594						9,188
Replace Refrigerator, Domestic			1,203		1,203	2,405			1,203				1,203		1,203
Replace Refrigerator, Mini, 3 Cu Ft					325										325
G20 Site Improvements															
Maintain Chain Link Fence, 8 Ln Ft	1,875	1,875	1,875	1,875	1,875	1,875	1,875	1,875	1,875	1,875	1,875	1,875	1,875	1,875	
Maintain, 6 Month Sliding Gate, Motor Operated	100	100	100	100		100	100	100	100	100	100	100	100	100	100
Repair Asphaltic Pavement, Parking Lot, >10,000 sq.ft - JE								12,142							
Replace Chain Link Fence, 8 Ln Ft															54,744
Replace Concrete Curb & Gutter - JE			11,148												
Replace Concrete Sidewalk, 4" Thick - JE			11,934												
Replace Motor Sliding Gate, Motor Operated															545
Replace Sliding Gate, Motor Operated					4,853										
Resurface Asphaltic Pavement, Parking Lot, >10,000 sq.ft - JE			97,694										97,694		
G40 Site Electrical Utilities															
Replace 400W H.P.S. Lamp Outdoor Pole Light - JE			1,125							563					
Replace Concrete Base Outdoor Pole Light - JE													761		
Replace Outdoor Pole Light - JE													5,273		

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Maintain, 6 Month Disposal, Garbage, Electric	384	384	384	384	384	384	384	384	384		384	384	384	384	384
Maintain, 6 Month Kitchen Exhaust Hood, Commercial	192	192	192	192	192	192	192	192	192	192	192	192	192	192	
Maintain, 6 Month Range/Oven	654	654	654	436	654	654	654	654	654	218	654	654	654	436	654
Replace Central Vacuum System - JE															
Replace Cooking Range, Commercial										2,322					
Replace Dishwasher, Electric										10,518					
Replace Disposal, Garbage, Electric										1,202					
Replace Kitchen Cabinet, Wood - JE										14,510					
Replace Kitchen Exhaust Hood, Commercial															6,005
Replace Kitchen Exhaust Hood, Domestic - JE															962
Replace Microwave Oven										238					
Replace Range/Oven				4,594						9,188				4,594	
Replace Refrigerator, Domestic	2,405			1,203				1,203		1,203	2,405			1,203	
Replace Refrigerator, Mini, 3 Cu Ft										325					
G20 Site Improvements															
Maintain Chain Link Fence, 8 Ln Ft	1,875	1,875	1,875	1,875	1,875	1,875	1,875	1,875	1,875	1,875	1,875	1,875	1,875	1,875	1,875
Maintain, 6 Month Sliding Gate, Motor Operated	100	100	100	100	100	100	100	100	100		100	100	100	100	100
Repair Asphaltic Pavement, Parking Lot, >10,000 sq.ft - JE			12,142										12,142		
Replace Chain Link Fence, 8 Ln Ft															
Replace Concrete Curb & Gutter - JE													11,148		
Replace Concrete Sidewalk, 4" Thick - JE				8,500									11,934		
Replace Motor Sliding Gate, Motor Operated															
Replace Sliding Gate, Motor Operated										4,853					
Resurface Asphaltic Pavement, Parking Lot, >10,000 sq.ft - JE								97,694							
G40 Site Electrical Utilities															
Replace 400W H.P.S. Lamp Outdoor Pole Light - JE								1,125							563
Replace Concrete Base Outdoor Pole Light - JE					380										
Replace Outdoor Pole Light - JE					2,637										

All costs expressed in ($) 2019

Tab 2 Building Reports, ATCT
Average M&R Costs
Most Costly M&R Tasks
Yearly M&R Cost Profile Chart
Building Extended Component List with Remaining Service Life
Building Deferred Maintenance Detail
M&R Costs by System per Year Chart
M&R Costs by Task per Year

TUL - ATCT Average M&R Costs

JACOBS

Facility:	TUL - Tulsa, OK	**PRV:**	$5,296,966
City:	Tulsa, OK	**Build Date:**	1958
Building:	TUL - ATCT	**GSFT:**	7,860

M&R Average Annual Cost Forecasts

	Current Year	5 Year	10 year	20 year	30 Year
Preventive Maintenace:	$24,476	$24,340	$25,750	$25,174	$25,287
Unscheduled Maintenance:	$27,579	$27,280	$30,199	$29,571	$29,680
Repair:	$1,898	$3,755	$12,619	$15,342	$15,062
Replacement:	$0	$7,758	$40,012	$62,458	$49,456
Total M&R Costs:	$53,953	$63,133	$108,581	$132,545	$119,485
Per GSFT:	$6.86	$8.03	$13.81	$16.86	$15.20
As % of PRV:	1.02%	1.19%	2.05%	2.50%	2.26%

All cost expressed in ($) 2019

TUL - ATCT - Most Costly M&R Tasks

JACOBS

Building: TUL - ATCT
Facility: TUL - Tulsa, OK
City: Tulsa, OK

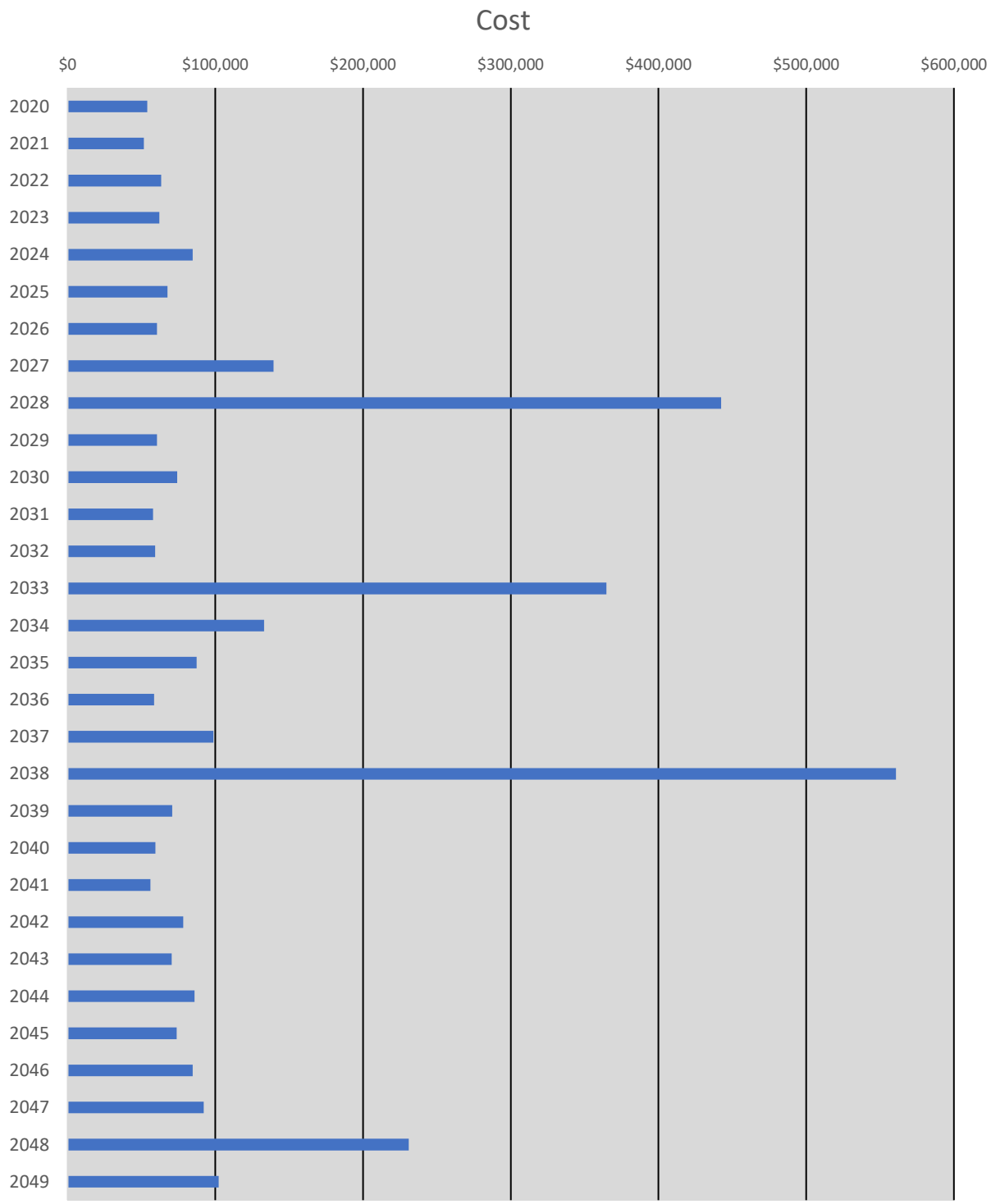
Average Built Date: 1958
30-Year Total M&R: $2,694,146
GSFT: 7,860

Task	30-Year Total Cost	Percent of Total M&R
Replace Tower Roof - JE	$320,220	11.89%
Replace Glass Panels - ATCT Cab (Tiers 2 & 3) - JE	$257,615	9.56%
Renovate Elevator, Geared, 6-15 Floor, 3,500 Lbs, 350 fpm	$123,125	4.57%
Maintain Elevator, Geared, 6-15 Floor, 3,500 Lbs, 350 fpm	$103,849	3.85%
Repair Circuit Breaker, 3 Ph., 600 V, 60 Amp	$89,021	3.30%
Maintain Circuit Breaker, 3 Ph., 600 V, 60 Amp	$64,147	2.38%
Replace Cab Glass Shades - JE	$52,158	1.94%
Replace Chiller, Reciprocal, Air-Cooled, 30.0 Ton	$48,313	1.79%
Repair Chiller, Reciprocal, Air-Cooled, 30.0 Ton	$45,280	1.68%
Replace Direct Digital Controls, System Points	$41,700	1.55%
Clean & Reseal Clay Brick Clay Brick, Exterior, >=, 3 Stories	$40,854	1.52%
Repair Glass Panels - ATCT Cab (Tiers 2 & 3) - JE	$34,732	1.29%
Replace Power Panel Board, 208 Y, 120 V, 100 Amp	$34,281	1.27%
Inspect & Test Boiler, Gas, 750 Mbh	$32,277	1.20%
Replace Boiler, Gas, 750 Mbh	$30,931	1.15%
Refinish Concrete Block, Painted, Interior Wall Finish	$28,623	1.06%
Repair Boiler, Gas, 750 Mbh	$24,472	0.91%
Replace Steel, Painted, Interior Door	$23,307	0.87%
Maintain, 1 Month Chiller, Reciprocal, Air-Cooled, 30.0 Ton	$21,576	0.80%
Repair Circuit Breaker, 3 Ph., 600 V, 100 Amp	$21,156	0.79%
Maintain, 1 Month Fire Extinguisher	$20,736	0.77%
Maintain Chiller, Reciprocal, Air-Cooled, 30.0 Ton	$20,590	0.76%
Replace Circuit Breaker, 3 Ph., 600 V, 60 Amp	$20,447	0.76%
Replace Air Handler, Multizone, 6,500 Cfm	$19,465	0.72%
Maintain Card Reader	$19,116	0.71%
Repoint (50% of Surface) Concrete Block, Painted, Interior Wall Finish	$18,971	0.70%
Replace Circulation Pump, 2 HP, Hot Water - JE	$18,828	0.70%
Refinish Steel, Painted, Exterior, >=, 3 Stories	$18,644	0.69%
Replace Power Panel Board, 208 Y, 120 V, 225 Amp	$18,438	0.68%
Maintain, 12 Month Air Handler, Single Zone, 1,300 Cfm	$18,386	0.68%
Maintain, 12 Month Air Handler, Single Zone, 2,500 Cfm	$18,386	0.68%

All costs expressed in ($) 2019

Building: TUL - ATCT

Facility: TUL - Tulsa, OK **City:** Tulsa, OK



All costs expressed in ($) 2019

Building Extended Component List with Remaining Service Life

JACOBS 2/18/2020

Building: TUL - ATCT
Facility: TUL - Tulsa, OK
City: Tulsa, OK

Last Inspection Date: 11/20/2019
Year Built: 1958
Replacement Value: $5,296,966 **per SF:** $674

Building Notes: Includes 400 SF Cab
Building Gsft: 7,860

Uniformat	Equip ID	Component	Install Year	Remaining Service Life	Quantity	Deferred Maintenance	Location	Note
B1020		Steel Roof Access Ladder	2004	24	12 LnFt			
B2010		Aluminum Louver, >=, 3 Stories	1958	-2	6 Each	$4,107		
B2010		Clay Brick, Exterior, >=, 3 Stories	1958	49	7,169 SqFt			Includes all levels
B2010		Precast Concrete Exterior Wall Panels - JE	1958	N/A	723 SqFt			Soffit under Seventh Floor
B2010		Precast Concrete Exterior Wall Panels - JE	1958	N/A	785 SqFt		Upper Levels	
B2010		Steel, Painted, Exterior, >=, 3 Stories	1958	13	587 SqFt		Cab	
B2010		Steel, Painted, Exterior, >=, 3 Stories	1958	49	3,741 SqFt			Structural steel, Includes all levels
B2020		Aluminum Fixed Window, >=, 3 Stories, 12 Sq Ft	1958	-12	3 Each	$1,326		
B2020		Aluminum Fixed Window, 2 Stories, 12 Sq Ft	1958	-12	1 Each	$417		Above Link
B2020		Glass Panels - ATCT Cab (Tiers 2 & 3) - JE	1958	-27	672 SqFt	$257,615		
B2030		Steel, Painted Exterior Access Door (Catwalk) - JE	1958	18	1 Each			
B3010		Aluminum Gutter, Downspouts, Fittings	1958	-42	0.125 KLnFt	$581	Cab Roof	
B3010		Flashing - JE	2005	-1	198 LnFt	$516	Catwalk	
B3010		Flashing - JE	2005	-1	76 LnFt	$198	Cab Roof	
B3010		Single-Ply Modified Bituminous/Thermoplastic Roof	2005	5	700 SqFt		Basement Roof	Assumed Roof Type
B3010		Tower Roof - JE	2005	-1	675 SqFt	$161,909	Cab Roof	
B3010		Tower Roof - JE	2005	-1	660 SqFt	$158,311	Catwalk	
B3020		Roof Hatch, Aluminum	2005	35	1 Each		Cab Roof	
C1020		Steel, Painted, Interior Door	1958	13	26 Each			
C1020		Steel, Painted, Interior Double Door	1958	13	9 Each			
C2010		Metal, Painted, Exterior Railing	1958	-32	74 LnFt	$3,747	Cab Roof	
C2010		Metal, Painted, Exterior Railing	1958	-32	125 LnFt	$6,330	Catwalk	
C2010		Metal, Painted, Interior Railing	1958	-12	300 LnFt	$7,039		
C2010		Metal, Painted, Interior Stairs	1958	49	747 SqFt			
C2020		Rubber Interior Stairs	2004	2	278 SqFt			
C3010		Cab Glass Shades - JE	2017	7	672 SqFt			Inner Shades
C3010		Cab Glass Shades - JE	2019	9	672 SqFt			Outer Shades
C3010		Concrete Block, Painted, Interior Wall Finish	1958	49	14,781 SqFt			
C3010		Concrete, Interior Wall Finish	1958	49	2,010 SqFt			
C3010		Plaster, Interior Wall Finish	1958	13	1,340 SqFt			
C3010		Plastic, Fiberglass Reinforced, Interior Wall Panels	2004	19	62 SqFt		Unisex Restroom	

All costs expressed in ($) 2019

Uniformat	Equip ID	Component	Install Year	Remaining Service Life	Quantity	Deferred Maintenance	Location	Note
C3010		Wallpaper, Interior Wall Finish	2004	-1	400 SqFt	$480	Cab	
C3020		Carpet, Nylon, High Traffic, 20 oz	2015	-1	720 SqFt	$4,396		
C3020		Concrete Flooring	1958	49	1,724 SqFt			
C3020		Metal Floor Grating	1958	49	136 SqFt			
C3020		Vinyl Tile Flooring	2004	-1	1,420 SqFt	$3,666		
C3030		Acoustical Tile, Dropped Ceiling - JE	2004	-1	575 SqFt	$1,445	Cab	
C3030		Concrete, Painted Ceiling	1958	49	930 SqFt			
C3030		Metal, Painted Ceiling	1958	49	800 SqFt			Exposed Structure
C3030		Plaster Ceiling	1958	13	1,680 SqFt			
D1010	EL-1	Elevator, Geared, 6-15 Floor, 3,500 Lbs, 350 fpm	1958	-37	1 Each	$123,125		2,500 lbs / 100 fpm
D2010	EWC-T2	Drinking Fountain, Refrigerated	1997	-13	1 Each	$1,290	Ninth Floor	
D2010		Flush Tank Water Closet, One Piece	2015	30	1 Each			
D2010		Lavatory, Vitreous China	1988	3	1 Each			
D2010	EWC-T1	Remote Water Chiller - JE	2004	-6	1 Each	$1,182	Cab	
D2010		Sink, Stainless Steel	2004	24	2 Each			
D2020		Gate Valve, 3.00 In	1997	-6	2 Each	$1,132		2"
D2020		Hose Bib	1958	-52	2 Each	$79		
D2020		Pipe & Fittings, 1" Steel - JE	1958	-1	0.135 KLnFt	$1,696		3/4"
D2020		Pipe & Fittings, 2" Steel - JE	1958	-1	0.148 KLnFt	$2,696		1-1/2"
D2020		Pipe Insulation, Fiberglass, Cold Water - JE	1958	-37	0.283 KLnFt	$1,051		
D2020	EWH-T2	Water Heater, Electric, 5 Gal	1997	-8	1 Each	$813	Seventh Floor	6 Gallon
D2020	EWH-T3	Water Heater, Instant Hot, 120 Gph	2018	13	1 Each		Cab	
D2030		Floor Drain	1958	-22	5 Each	$1,274		
D2030		Pipe & Fittings, 2" Cast Iron - JE	1958	13	0.212 KLnFt			
D2030		Pipe & Fittings, 4" Cast Iron - JE	1958	13	0.169 KLnFt			
D2040		Roof Drain, 2.00 In	2005	25	3 Each		Catwalk	
D2040	SP-1, SP-2	Sump Pump, 0.500 HP	2015	15	2 Each		Basement	1/3 HP
D2090	AC-2	Air Compressor, 2.000 HP	1958	-37	1 Each	$6,264	Basement	1-1/2 HP
D2090	AD-2	Compressed Air Dryer	2010	5	1 Each		Basement	10 SCFM
D3020		Ball Valve, 2.00 In	2019	14	6 Each			
D3020	B-T1, B-T2	Boiler, Gas, 750 Mbh	2016	26	2 Each		Basement	630 MBH output
D3020		Check Valve, 4.00 In	2016	16	1 Each			2"
D3020		Check Valve, 4.00 In	1997	-3	2 Each	$4,015		2"
D3020	CPF-2	Chemical Bypass Pot Feeder - JE	1997	-3	1 Each	$1,073	Basement	
D3020	P-T1	Circulation Pump, 2 HP, Hot Water - JE	1997	-9	1 Each	$4,707	Basement	1-1/2 HP

Uniformat	Equip ID	Component	Install Year	Remaining Service Life	Quantity	Deferred Maintenance	Location	Note
D3020	P-T4	Circulation Pump, 2 HP, Hot Water - JE	2019	13	1 Each		Basement	1-1/2 HP
D3020	P-T2, P-T3	Circulator Pump, 1 HP, Hot Water - JE	2000	-5	2 Each	$8,952	Basement	3/4 HP
D3020	ET-T2	Expansion Tank, 100 Gal	1997	27	1 Each		Basement	80 Gallon
D3020	BBT-1	Expansion Tank, 100 Gal	2019	49	1 Each		Basement	120 Gallon, Boiler Buddy Tank
D3020	ET-T1	Expansion Tank, 30 Gal	1997	27	1 Each		Basement	21.7 Gallon
D3020	EF-T3	Expansion Tank, 60 Gal	1997	27	1 Each		Seventh Floor	62 Gallon
D3020		Pipe Insulation, Fiberglass, Heating Water/Steam - JE	1958	-37	0.293 KLnFt	$1,671		
D3030		Calibrated Balancing Valve, 2.00 In	1997	-6	2 Each	$312		
D3030	TCH-1	Chiller, Reciprocal, Air-Cooled, 30.0 Ton	2016	18	1 Each		Grade	Scroll Compressors
D3030	P-T1C	Circulation Pump, Chiller & Condenser Water, 5.000 HP	1997	-6	1 Each	$4,578	Basement	
D3030	TCU-1, TCU-2	Condenser, Air-Cooled, 3.0 Ton	2016	13	2 Each		Catwalk	
D3030		Flow Control Valve, Motorized, 2.00 In	1997	-1	2 Each	$3,474		
D3030		Pipe & Fittings, 2" Steel - JE	1958	13	0.585 KLnFt			
D3030		Pipe Insulation, Fiberglass, Chilled Water - JE	1958	-37	0.292 KLnFt	$1,113		
D3040	AHU-T1	Air Handler, Multizone, 6,500 Cfm	1997	-4	1 Each	$19,465	Seventh Floor	Approximately 6,000 Cfm
D3040	TAHU-1, TAHU-2	Air Handler, Single Zone, 1,300 Cfm	2016	15	2 Each		Junction Level	1,555 Cfm
D3040	AHU-T2, AHU-T3	Air Handler, Single Zone, 2,500 Cfm	1958	-43	2 Each	$15,293	Basement	
D3040		Duct Insulation, Fiberglass - JE	1958	-27	1,299 SqFt	$4,572		
D3040		Ductwork - JE	1958	-27	1,624 Lbs	$10,577		
D3040	EF-T2	Exhaust Fan, Bathroom 150 cfm - JE	2014	13	1 Each		Ninth Floor	95 Cfm
D3040	SF-1	Exhaust Fan, Propeller, 20,000 Cfm	1996	-5	1 Each	$2,673	Second Floor	17,500 Cfm
D3040	DF-1	Exhaust Fan, Roof Mounted, 1,500 Cfm	2016	15	1 Each		Top of Boiler Flue	Draft Inducing Fan
D3040	EF-T1	Exhaust Fan, Roof Mounted, 2,000 Cfm	1958	-43	1 Each	$1,213	Cab Roof	
D3040	CLF-1	Residential Type Ceiling Fan	2004	3	1 Each		Cab	
D3040		Steel Damper, Motorized	2004	44	1 Each			
D3050	AC-1	Air Conditioner, Window, 1.0 Ton	2014	16	1 Each		Ninth Floor	19.5 MBH
D3050	AC-3	Air Conditioner, Window, 2.0 Ton	1987	-11	1 Each	$1,454	Seventh Floor	
D3050	AC-2	Air Conditioner, Window, 2.0 Ton	2017	19	1 Each		Eighth Floor	24.7 MBH
D3060		Direct Digital Controls, System Points	1997	-13	24 Each	$13,900		
D3060		Metasys Controllers - JE	1997	-8	3 Each	$3,429		
D4010	FACP-1	Fire Alarm Control Panel	2012	7	1 Each		First Floor	
D4030	FAAP-1	Fire Annunciator Panel - JE	2012	7	1 Each		Cab	
D4030		Fire Extinguisher	2012	4	14 Each			
D4090	KFS-1	Kitchen Fire Suppression System (CO2)	2012	12	1 Each		Ninth Floor	
D5010		Circuit Breaker, 15/20 Amp. - JE	1994	4	6 Each			

Uniformat	Equip ID	Component	Install Year	Remaining Service Life	Quantity	Deferred Maintenance	Location	Note
D5010		Circuit Breaker, 15/20 Amp. - JE	1997	7	3 Each			
D5010		Circuit Breaker, 15/20 Amp. - JE	2004	14	22 Each			
D5010		Circuit Breaker, 15/20 Amp. - JE	1958	-32	83 Each	$2,485		
D5010		Circuit Breaker, 15/20 Amp. - JE	1988	-2	87 Each	$2,605		
D5010		Circuit Breaker, 3 Ph., 600 V, 100 Amp	2004	14	1 Each			70-100 Amp
D5010		Circuit Breaker, 3 Ph., 600 V, 100 Amp	2004	14	1 Each			100 Amp Enclosed Circuit Breaker
D5010		Circuit Breaker, 3 Ph., 600 V, 100 Amp	1958	-32	1 Each	$1,327		70-100 Amp
D5010		Circuit Breaker, 3 Ph., 600 V, 100 Amp	1988	-1	14 Each	$18,573		70-100 Amp
D5010		Circuit Breaker, 3 Ph., 600 V, 60 Amp	1994	4	3 Each			30-60 Amp
D5010		Circuit Breaker, 3 Ph., 600 V, 60 Amp	1997	7	7 Each			30-60 Amp
D5010		Circuit Breaker, 3 Ph., 600 V, 60 Amp	2004	14	1 Each			30-60 Amp
D5010		Circuit Breaker, 3 Ph., 600 V, 60 Amp	1958	-32	6 Each	$7,217		30-60 Amp
D5010		Circuit Breaker, 3 Ph., 600 V, 60 Amp	1988	-1	56 Each	$67,356		30-60 Amp
D5010		Circuit Breaker, 600 V, 400 Amp	1988	-1	3 Each	$12,823		125-400 Amp
D5010		Disconnect Switch, 100 Amp	1997	27	1 Each			
D5010		Disconnect Switch, 100 Amp	2004	34	3 Each			
D5010		Disconnect Switch, 200 Amp	1997	27	1 Each			
D5010		Disconnect Switch, 200 Amp	2016	46	1 Each			
D5010		Disconnect Switch, 30 Amp	2016	46	1 Each			
D5010		Disconnect Switch, 60 Amp	2004	34	1 Each			
D5010		Disconnect Switch, 60 Amp	1958	-12	1 Each	$747		
D5010		Motor Starter, 10.000 HP, 208 V	1996	-6	1 Each	$1,631		5 HP
D5010		Motor Starter, 2.000 HP, 208 V	2004	2	1 Each			
D5010		Motor Starter, 2.000 HP, 208 V	1997	-5	4 Each	$2,733		
D5010	EL1	Power Panel Board, 208 Y, 120 V, 100 Amp	1994	4	1 Each		Basement	60 Amp
D5010	AHU 1 & 2 Panel	Power Panel Board, 208 Y, 120 V, 100 Amp	1997	7	1 Each		Junction Level	Load Center Type Panel
D5010	Back-up A/Cs	Power Panel Board, 208 Y, 120 V, 100 Amp	1997	7	1 Each		Seventh Floor	Load Center Type Panel
D5010	P9A	Power Panel Board, 208 Y, 120 V, 100 Amp	2004	14	1 Each		Ninth Floor	
D5010	P10	Power Panel Board, 208 Y, 120 V, 100 Amp	2004	14	1 Each		Cab	
D5010	P7	Power Panel Board, 208 Y, 120 V, 100 Amp	1958	-32	1 Each	$3,809	Seventh Floor	
D5010	PP8	Power Panel Board, 208 Y, 120 V, 100 Amp	1958	-32	1 Each	$3,809	Eighth Floor	
D5010	PP8A	Power Panel Board, 208 Y, 120 V, 100 Amp	1988	-2	1 Each	$3,809	Eighth Floor	40 Amp
D5010	PP2	Power Panel Board, 208 Y, 120 V, 100 Amp	1988	-2	1 Each	$3,809	Junction Level	20 Amp
D5010	Panel 14	Power Panel Board, 208 Y, 120 V, 225 Amp	1958	-32	1 Each	$6,146	Junction Level	
D5010	7th Floor PP	Power Panel Board, 208 Y, 120 V, 225 Amp	1988	-2	1 Each	$6,146	Seventh Floor	

Uniformat	Equip ID	Component	Install Year	Remaining Service Life	Quantity	Deferred Maintenance	Location	Note
D5010	Basement LP	Power Panel Board, 208 Y, 120 V, 225 Amp	1988	-2	1 Each	$6,146	Basement	
D5010	BPPE, BPPE-2	Power Panel Board, 208 Y, 120 V, 400 Amp	1989	-1	2 Each	$14,588	Basement	
D5010	T4	Secondary Transformer, Dry, 15 kVA	2004	14	1 Each		Eighth Floor	
D5010	T7	Secondary Transformer, Dry, 150 kVA	2004	14	1 Each		Grade	
D5010	T6	Secondary Transformer, Dry, 30 kVA	2004	14	1 Each		Junction Level	
D5010	T5	Secondary Transformer, Dry, 30 kVA	2004	14	1 Each		Eighth Floor	
D5010	T3	Secondary Transformer, Dry, 30 kVA	2004	14	1 Each		Seventh Floor	
D5010		Transient Voltage Surge Suppression Panel	2004	14	4 Each			
D5020		Emergency Lighting Pack, 2 Light w/ Battery	2004	4	6 Each			
D5020		Emergency Lighting Pack, 2 Light w/ Battery	1997	-3	3 Each	$2,778		
D5020		Exit Lighting Fixture, LED	2004	4	4 Each			
D5020		Fluorescent Lighting Fixture, T12, 40 W	1958	-42	4 Each	$624		2 Bulb Fixtures
D5020		Fluorescent Lighting Fixture, T12, 60 W	1958	-42	4 Each	$624		4 Bulb Fixtures
D5020		Fluorescent Lighting Fixture, T12, 60 W	1958	-42	15 Each	$2,340		3 Bulb Fixtures
D5020		Fluorescent Lighting Fixture, T8, 32 W	2004	4	2 Each			
D5020		Grounded Fault Circuit Interrupter, 15 Amp	2014	14	2 Each			
D5020		Incandescent Lighting Fixture, Basic, 100 W	2004	4	10 Each		Cab	
D5020		Incandescent Lighting Fixture, Basic, 100 W	1958	-42	38 Each	$5,210		
D5020		LED Lighting Fixture, Basic, 20 W	2016	16	1 Each			2 Bulb Fixture
D5020		LED Obstruction Light - JE	1958	-42	4 Each	$1,529	Cab Roof	Incandescent
D5020		Motion Sensing Wall Switch	2014	4	1 Each			
D5020		Receptacle, 120 V, 20 Amp	1958	-42	102 Each	$5,991		
D5020		Wiring Device, Switch	1958	-47	40 Each	$1,075		
D5030		Card Reader	2004	-6	1 Each	$619		
D5030		Electronic Lock	2004	-6	1 Each	$213		
D5030		Fire Alarm Horn & Strobe	2012	12	15 Each			
D5030		Intercom Speaker	2004	4	1 Each			
D5030		Intrusion Detection Motion Detector, Interior	2004	-6	1 Each	$572		
D5030		Manual Pull Station	2012	7	12 Each			
D5030		Remote Door Release System - JE	2012	7	5 Each			
D5030		Smoke Detector	2012	7	20 Each			
D5030		Smoke Detector, Duct	2012	7	4 Each			
D5090		Lightning Protection - JE	1958	-37	0.206 KLnFt	$623		
E1010	D-3	Disposal, Garbage, Electric	2004	-6	1 Each	$401	Ninth Floor	
E1010		Kitchen Exhaust Hood, Domestic - JE	2004	-1	1 Each	$481		

Uniformat	Equip ID	Component	Install Year	Remaining Service Life	Quantity	Deferred Maintenance	Location	Note
E1010		Range/Oven	2004	-6	1 Each	$4,594		
E1010		Refrigerator, Domestic	2012	2	1 Each			
E1010		Refrigerator, Mini, 3 Cu Ft	2004	-6	1 Each	$325	Cab	
E1020	CV-T1	Central Vacuum System - JE	2004	14	1 Each		Junction Level	
E1020		Dishwasher, Electric	2004	-6	1 Each	$5,259		
G9090		TUL - ATCT Duplicates $1,860,160 - $357,360 (APP E)	1958	N/A	1 Each	$1,502,800		

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building Name: TUL - ATCT

Year Installed	Years Deferred	Deferred Maintenance Tasks	Quantity	UoM	Deferred Maintenance Cost	Equip ID
1958	N/A	TUL - ATCT Duplicates $1,860,160 - $357,360 (APP E)	1	Each	$1,502,800	
1958	27	Replace Glass Panels - ATCT Cab (Tiers 2 & 3) - JE	672	SqFt	$257,615	
2005	1	Replace Tower Roof - JE	675	SqFt	$161,909	
2005	1	Replace Tower Roof - JE	660	SqFt	$158,311	
1958	37	Renovate Elevator, Geared, 6-15 Floor, 3,500 Lbs, 350 fpm	1	Each	$123,125	EL-1
1988	1	Replace Circuit Breaker, 3 Ph., 600 V, 60 Amp	56	Each	$67,356	
1997	4	Replace Air Handler, Multizone, 6,500 Cfm	1	Each	$19,465	AHU-T1
1988	1	Replace Circuit Breaker, 3 Ph., 600 V, 100 Amp	14	Each	$18,573	
1958	43	Replace Air Handler, Single Zone, 2,500 Cfm	2	Each	$15,293	AHU-T2, AHU-T3
1989	1	Replace Power Panel Board, 208 Y, 120 V, 400 Amp	2	Each	$14,588	BPPE, BPPE-2
1997	13	Replace Direct Digital Controls, System Points	24	Each	$13,900	
1988	1	Replace Circuit Breaker, 600 V, 400 Amp	3	Each	$12,823	
1958	27	Replace Ductwork - JE	1,624	Lbs	$10,577	
2000	5	Replace Circulator Pump, 1 HP, Hot Water - JE	2	Each	$8,952	P-T2, P-T3
1958	32	Replace Circuit Breaker, 3 Ph., 600 V, 60 Amp	6	Each	$7,217	
1958	12	Replace Metal, Painted, Interior Railing	300	LnFt	$7,039	
1958	32	Replace Metal, Painted, Exterior Railing	125	LnFt	$6,330	
1958	37	Replace Air Compressor, 2.000 HP	1	Each	$6,264	AC-2
1958	32	Replace Power Panel Board, 208 Y, 120 V, 225 Amp	1	Each	$6,146	Panel 14
1988	2	Replace Power Panel Board, 208 Y, 120 V, 225 Amp	1	Each	$6,146	7th Floor PP
1988	2	Replace Power Panel Board, 208 Y, 120 V, 225 Amp	1	Each	$6,146	Basement LP
1958	42	Replace Receptacle, 120 V, 20 Amp	102	Each	$5,991	
2004	6	Replace Dishwasher, Electric	1	Each	$5,259	
1958	42	Replace Incandescent Lighting Fixture, Basic, 100 W	38	Each	$5,210	
1997	9	Replace Circulation Pump, 2 HP, Hot Water - JE	1	Each	$4,707	P-T1
2004	6	Replace Range/Oven	1	Each	$4,594	
1997	6	Replace Circulation Pump, Chiller & Condenser Water, 5.000 HP	1	Each	$4,578	P-T1C
1958	27	Replace Duct Insulation, Fiberglass - JE	1,299	SqFt	$4,572	
2015	1	Replace Carpet, Nylon, High Traffic, 20 oz	720	SqFt	$4,396	
1958	2	Replace Aluminum Louver, >=, 3 Stories	6	Each	$4,107	
1997	3	Replace Check Valve, 4.00 In	2	Each	$4,015	
1958	32	Replace Power Panel Board, 208 Y, 120 V, 100 Amp	1	Each	$3,809	P7
1958	32	Replace Power Panel Board, 208 Y, 120 V, 100 Amp	1	Each	$3,809	PP8
1988	2	Replace Power Panel Board, 208 Y, 120 V, 100 Amp	1	Each	$3,809	PP8A
1988	2	Replace Power Panel Board, 208 Y, 120 V, 100 Amp	1	Each	$3,809	PP2
1958	32	Replace Metal, Painted, Exterior Railing	74	LnFt	$3,747	
2004	1	Replace Vinyl Tile Flooring	1,420	SqFt	$3,666	
1997	1	Replace Flow Control Valve, Motorized, 2.00 In	2	Each	$3,474	
1997	8	Replace Metasys Controllers - JE	3	Each	$3,429	
1997	3	Replace Emergency Lighting Pack, 2 Light w/ Battery	3	Each	$2,778	
1997	5	Replace Motor Starter, 2.000 HP, 208 V	4	Each	$2,733	
1958	1	Replace Pipe & Fittings, 2" Steel - JE	0.148	KLnFt	$2,696	
1996	5	Replace Exhaust Fan, Propeller, 20,000 Cfm	1	Each	$2,673	SF-1
1988	2	Replace Circuit Breaker, 15/20 Amp. - JE	87	Each	$2,605	
1958	32	Replace Circuit Breaker, 15/20 Amp. - JE	83	Each	$2,485	
1958	42	Replace Fluorescent Lighting Fixture, T12, 60 W	15	Each	$2,340	
1958	1	Replace Pipe & Fittings, 1" Steel - JE	0.135	KLnFt	$1,696	
1958	37	Replace Pipe Insulation, Fiberglass, Heating Water/Steam - JE	0.293	KLnFt	$1,671	

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building Name: TUL - ATCT

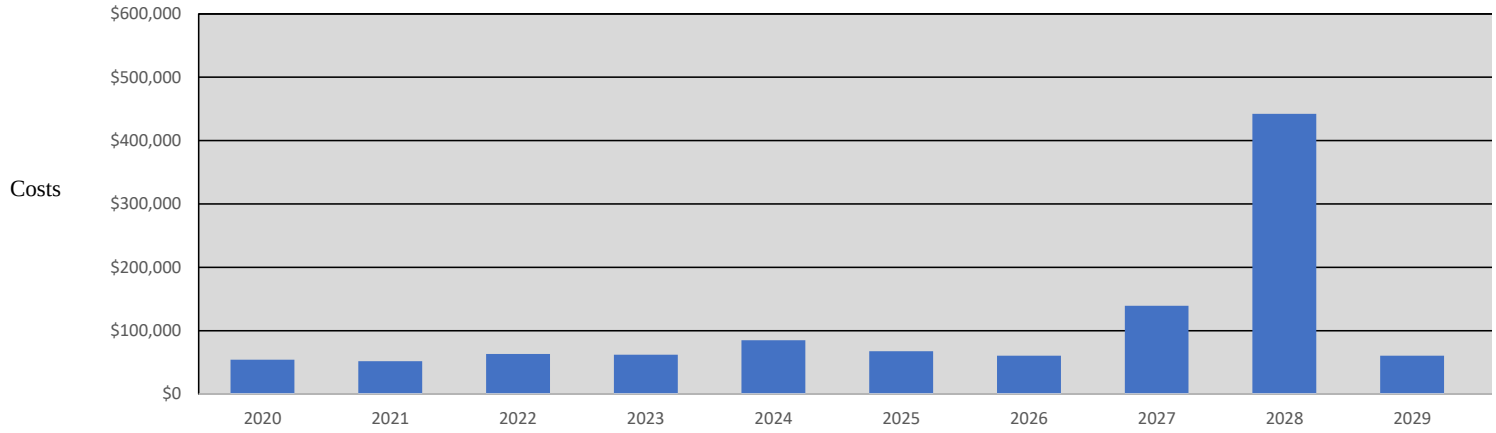
Year Installed	Years Deferred	Deferred Maintenance Tasks	Quantity	UoM	Deferred Maintenance Cost	Equip ID
1996	6	Replace Motor Starter, 10.000 HP, 208 V	1	Each	$1,631	
1958	42	Replace LED Obstruction Light - JE	4	Each	$1,529	
1987	11	Replace Air Conditioner, Window, 2.0 Ton	1	Each	$1,454	AC-3
2004	1	Replace Acoustical Tile, Dropped Ceiling - JE	575	SqFt	$1,445	
1958	32	Replace Circuit Breaker, 3 Ph., 600 V, 100 Amp	1	Each	$1,327	
1958	12	Replace Aluminum Fixed Window, >=, 3 Stories, 12 Sq Ft	3	Each	$1,326	
1997	13	Replace Drinking Fountain, Refrigerated	1	Each	$1,290	EWC-T2
1958	22	Replace Floor Drain	5	Each	$1,274	
1958	43	Replace Exhaust Fan, Roof Mounted, 2,000 Cfm	1	Each	$1,213	EF-T1
2004	6	Replace Remote Water Chiller - JE	1	Each	$1,182	EWC-T1
1997	6	Replace Gate Valve, 3.00 In	2	Each	$1,132	
1958	37	Replace Pipe Insulation, Fiberglass, Chilled Water - JE	0.292	KLnFt	$1,113	
1958	47	Replace Wiring Device, Switch	40	Each	$1,075	
1997	3	Replace Chemical Bypass Pot Feeder - JE	1	Each	$1,073	CPF-2
1958	37	Replace Pipe Insulation, Fiberglass, Cold Water - JE	0.283	KLnFt	$1,051	
1997	8	Replace Water Heater, Electric, 5 Gal	1	Each	$813	EWH-T2
1958	12	Replace Disconnect Switch, 60 Amp	1	Each	$747	
1958	42	Replace Fluorescent Lighting Fixture, T12, 40 W	4	Each	$624	
1958	42	Replace Fluorescent Lighting Fixture, T12, 60 W	4	Each	$624	
1958	37	Replace Lightning Protection - JE	0.206	KLnFt	$623	
2004	6	Replace Card Reader	1	Each	$619	
1958	42	Replace Aluminum Gutter, Downspouts, Fittings	0.125	KLnFt	$581	
2004	6	Replace Intrusion Detection Motion Detector, Interior	1	Each	$572	
2005	1	Replace Flashing - JE	198	LnFt	$516	
2004	1	Replace Kitchen Exhaust Hood, Domestic - JE	1	Each	$481	
2004	1	Replace Wallpaper, Interior Wall Finish	400	SqFt	$480	
1958	12	Replace Aluminum Fixed Window, 2 Stories, 12 Sq Ft	1	Each	$417	
2004	6	Replace Disposal, Garbage, Electric	1	Each	$401	D-3
2004	6	Replace Refrigerator, Mini, 3 Cu Ft	1	Each	$325	
1997	6	Replace Calibrated Balancing Valve, 2.00 In	2	Each	$312	
2004	6	Replace Electronic Lock	1	Each	$213	
2005	1	Replace Flashing - JE	76	LnFt	$198	
1958	52	Replace Valve Hose Bib	2	Each	$79	
				Total:	**$2,556,973**	

All costs expressed in ($) 2019

Building: TUL - ATCT **GSFT:** 7,860

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
B10 Super Structure										
B20 Exterior Enclosure	$26	$26	$42	$656	$26	$26	$42	$26	$308,092	$26
B30 Roofing	$693	$643	$643	$643	$643	$4,680	$643	$643	$643	$643
C10 Interior Construction			$873	$1,542			$873		$7,956	
C20 Stairs			$2,296				$659		$126	
C30 Interior Finishes	$10	$88	$3,934	$88	$32	$88	$3,876	$13,089	$13,252	$8,781
D10 Conveying	$4,843	$4,843	$4,843	$4,843	$4,843	$4,843	$4,843	$4,843	$4,843	$4,843
D20 Plumbing	$6,313	$4,035	$4,915	$4,615	$5,599	$9,632	$4,870	$5,724	$4,568	$4,080
D30 HVAC	$21,848	$21,180	$22,701	$28,799	$21,701	$28,035	$24,209	$62,184	$42,306	$21,527
D40 Fire Protection	$2,538	$2,538	$2,633	$2,538	$5,738	$2,538	$2,538	$6,040	$2,538	$2,538
D50 Electrical	$15,704	$16,339	$17,302	$16,290	$35,217	$15,722	$15,937	$44,789	$56,103	$15,995
E10 Equipment	$1,978	$1,978	$3,181	$1,978	$10,887	$1,978	$1,978	$1,978	$1,978	$1,978
G20 Site Improvements										
G40 Site Electrical Utilities										
Total $	**$53,953**	**$51,670**	**$63,363**	**$61,992**	**$84,686**	**$67,542**	**$60,468**	**$139,316**	**$442,405**	**$60,411**

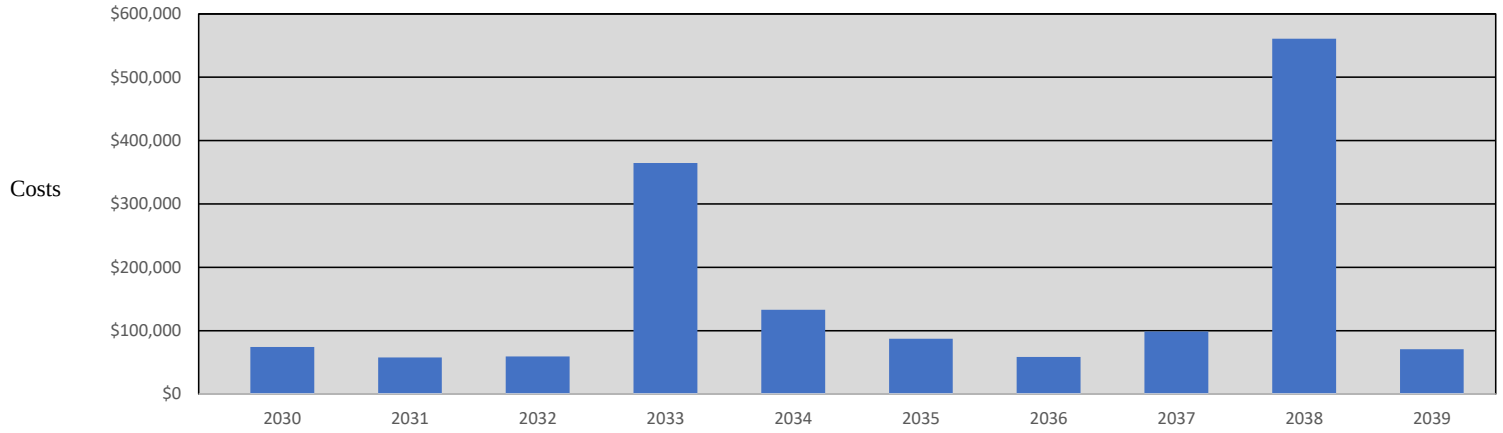


All costs expressed in ($) 2019

Building: TUL - ATCT **GSFT:** 7,860

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Forcast Year:	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	Total $
B10 Super Structure					$319						**$319**
B20 Exterior Enclosure	$42	$26	$26	$54,788	$42	$26	$26	$26	$67,194	$26	**$431,210**
B30 Roofing	$693	$643	$643	$643	$643	$2,581	$643	$643	$321,033	$1,357	**$340,039**
C10 Interior Construction	$873			$37,899				$873	$1,542		**$52,431**
C20 Stairs	$659			$2,505	$659				$785		**$7,689**
C30 Interior Finishes	$3,876	$146		$57,034	$3,908	$4,396	$10	$12,447	$14,908	$10,851	**$150,814**
D10 Conveying	$4,843	$4,843	$4,843	$123,125	$4,843	$4,843	$4,843	$4,843	$4,843	$4,843	**$215,142**
D20 Plumbing	$5,679	$5,212	$4,198	$23,150	$5,560	$5,424	$4,278	$5,950	$5,101	$4,080	**$122,983**
D30 HVAC	$36,559	$26,743	$22,603	$41,032	$40,265	$49,854	$24,329	$46,390	$66,757	$28,533	**$677,555**
D40 Fire Protection	$2,538	$2,538	$4,494	$2,538	$2,538	$2,538	$5,738	$2,633	$2,538	$2,538	**$62,808**
D50 Electrical	$16,339	$15,722	$19,225	$20,093	$59,552	$15,704	$16,670	$22,867	$74,152	$16,630	**$526,352**
E10 Equipment	$1,978	$1,978	$3,181	$1,978	$14,662	$1,978	$1,978	$1,978	$1,978	$1,978	**$63,559**
G20 Site Improvements											
G40 Site Electrical Utilities											
Total $	**$74,079**	**$57,851**	**$59,213**	**$364,785**	**$132,991**	**$87,344**	**$58,515**	**$98,650**	**$560,831**	**$70,836**	**$2,650,901**



All costs expressed in ($) 2019

M&R Cost by Task per Year

JACOBS

Facility: TUL - Tulsa, OK **City:** Tulsa, OK
Building: TUL - ATCT

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
B10 Super Structure															
Repair Steel Roof Access Ladder															319
Replace Steel Roof Access Ladder															
B20 Exterior Enclosure															
Clean & Reseal Clay Brick Clay Brick, Exterior, >=, 3 Stories									13,618						
Finish Repaired Steel, Painted, Exterior, >=, 3 Stories														112	
Finish Replaced Steel, Painted Exterior Access Door (Catwalk) - JE															
Finish Replaced Steel, Painted, Exterior, >=, 3 Stories														10,266	
Maintain Steel, Painted Exterior Access Door (Catwalk) - JE	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Minor Repair Precast Concrete Exterior Wall Panels - JE														1,431	
Recaulk Precast Concrete Exterior Wall Panels - JE				630					630					630	
Refinish Aluminum Louver, >=, 3 Stories									421						
Refinish Steel, Painted Exterior Access Door (Catwalk) - JE			16				16				16				16
Refinish Steel, Painted, Exterior, >=, 3 Stories									6,509						
Repair (2% of Walls) Clay Brick, Exterior, >=, 3 Stories														3,852	
Repair (2% of Walls) Steel, Painted, Exterior, >=, 3 Stories														2,277	
Repair Aluminum Fixed Window, >=, 3 Stories, 12 Sq Ft															
Repair Aluminum Fixed Window, 2 Stories, 12 Sq Ft															
Repair Glass Panels - ATCT Cab (Tiers 2 & 3) - JE															
Repair Steel, Painted Exterior Access Door (Catwalk) - JE									265						
Replace Glass Panels - ATCT Cab (Tiers 2 & 3) - JE									257,615						
Replace Steel, Painted Exterior Access Door (Catwalk) - JE															
Replace Steel, Painted, Exterior, >=, 3 Stories														17,860	
Repoint (50% of Surface) Clay Brick, Exterior, >=, 3 Stories														18,334	
B30 Roofing															
Maintain Aluminum Gutter, Downspouts, Fittings	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
Maintain Roof Hatch, Aluminum	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39
Maintain Single-Ply Modified Bituminous/Thermoplastic Roof	57	57	57	57	57		57	57	57	57	57	57	57	57	57
Maintain Tower Roof - JE	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - ATCT

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
B10 Super Structure															
Repair Steel Roof Access Ladder															
Replace Steel Roof Access Ladder										1,017					
B20 Exterior Enclosure															
Clean & Reseal Clay Brick Clay Brick, Exterior, >=, 3 Stories				13,618										13,618	
Finish Repaired Steel, Painted, Exterior, >=, 3 Stories															
Finish Replaced Steel, Painted Exterior Access Door (Catwalk) - JE				21											
Finish Replaced Steel, Painted, Exterior, >=, 3 Stories															
Maintain Steel, Painted Exterior Access Door (Catwalk) - JE	8	8	8		8	8	8	8	8	8	8	8	8	8	8
Minor Repair Precast Concrete Exterior Wall Panels - JE															
Recaulk Precast Concrete Exterior Wall Panels - JE				630					630					630	
Refinish Aluminum Louver, >=, 3 Stories				421										421	
Refinish Steel, Painted Exterior Access Door (Catwalk) - JE								16				16			
Refinish Steel, Painted, Exterior, >=, 3 Stories				5,626					883					5,626	
Repair (2% of Walls) Clay Brick, Exterior, >=, 3 Stories															
Repair (2% of Walls) Steel, Painted, Exterior, >=, 3 Stories															
Repair Aluminum Fixed Window, >=, 3 Stories, 12 Sq Ft				48											
Repair Aluminum Fixed Window, 2 Stories, 12 Sq Ft				16											
Repair Glass Panels - ATCT Cab (Tiers 2 & 3) - JE				17,366										17,366	
Repair Steel, Painted Exterior Access Door (Catwalk) - JE															
Replace Glass Panels - ATCT Cab (Tiers 2 & 3) - JE															
Replace Steel, Painted Exterior Access Door (Catwalk) - JE				440											
Replace Steel, Painted, Exterior, >=, 3 Stories															
Repoint (50% of Surface) Clay Brick, Exterior, >=, 3 Stories															
B30 Roofing															
Maintain Aluminum Gutter, Downspouts, Fittings	24	24	24		24	24	24	24	24	24	24	24	24	24	24
Maintain Roof Hatch, Aluminum	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39
Maintain Single-Ply Modified Bituminous/Thermoplastic Roof	57	57	57	57	57	57	57	57	57	57		57	57	57	57
Maintain Tower Roof - JE	138	138	138		138	138	138	138	138	138	138	138	138	138	138

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - ATCT

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Minor Repair Tower Roof - JE						562									
Non-Destructive Moisture Inspection Single-Ply Modified Bituminous/Thermoplastic Roof	50										50				
Repair Single-Ply Modified Bituminous/Thermoplastic Roof															
Replace Aluminum Gutter, Downspouts, Fittings															
Replace Flashing - JE															
Replace Membrane Single-Ply Modified Bituminous/Thermoplastic Roof						3,608									
Replace Tower Roof - JE															
C10 Interior Construction															
Finish Replaced Steel, Painted, Interior Door														519	
Finish Replaced Steel, Painted, Interior Double Door														354	
Maintain Door Locks Steel, Painted, Interior Door				334					334						
Maintain Door Locks Steel, Painted, Interior Double Door				116					116						
Refinish Steel, Painted, Interior Door			519				519				519				
Refinish Steel, Painted, Interior Double Door			354				354				354				
Replace Door Locks Steel, Painted, Interior Door									4,765						
Replace Door Locks Steel, Painted, Interior Double Door									1,649						
Replace Steel, Painted, Interior Door														23,307	
Replace Steel, Painted, Interior Double Door														13,719	
C20 Stairs															
Finish Repaired Metal, Painted, Exterior Railing														3	
Finish Repaired Metal, Painted, Interior Railing														5	
Finish Repaired Metal, Painted, Interior Stairs														13	
Finish Replaced Metal, Painted, Exterior Railing															
Finish Replaced Metal, Painted, Interior Stairs														470	
Refinish Metal, Painted, Exterior Railing									126						
Refinish Metal, Painted, Interior Railing			189				189				189				189
Refinish Metal, Painted, Interior Stairs			470				470				470				470
Repair Metal, Painted, Exterior Railing														178	
Repair Metal, Painted, Interior Railing														268	

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - ATCT

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Minor Repair Tower Roof - JE	562													562	
Non-Destructive Moisture Inspection Single-Ply Modified Bituminous/Thermoplastic Roof	50					50									
Repair Single-Ply Modified Bituminous/Thermoplastic Roof	1,326														
Replace Aluminum Gutter, Downspouts, Fittings				581											
Replace Flashing - JE					714										
Replace Membrane Single-Ply Modified Bituminous/Thermoplastic Roof											3,608				
Replace Tower Roof - JE				320,220											
C10 Interior Construction															
Finish Replaced Steel, Painted, Interior Door															
Finish Replaced Steel, Painted, Interior Double Door															
Maintain Door Locks Steel, Painted, Interior Door				334					334					334	
Maintain Door Locks Steel, Painted, Interior Double Door				116					116					116	
Refinish Steel, Painted, Interior Door			519				519				519				519
Refinish Steel, Painted, Interior Double Door			354				354				354				354
Replace Door Locks Steel, Painted, Interior Door									4,765						
Replace Door Locks Steel, Painted, Interior Double Door									1,649						
Replace Steel, Painted, Interior Door															
Replace Steel, Painted, Interior Double Door															
C20 Stairs															
Finish Repaired Metal, Painted, Exterior Railing															
Finish Repaired Metal, Painted, Interior Railing														5	
Finish Repaired Metal, Painted, Interior Stairs														13	
Finish Replaced Metal, Painted, Exterior Railing														126	
Finish Replaced Metal, Painted, Interior Stairs															
Refinish Metal, Painted, Exterior Railing				126											
Refinish Metal, Painted, Interior Railing				189				189				189			
Refinish Metal, Painted, Interior Stairs				470				470				470			
Repair Metal, Painted, Exterior Railing															
Repair Metal, Painted, Interior Railing														268	

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - ATCT

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Repair Metal, Painted, Interior Stairs														1,568	
Replace Metal, Painted, Exterior Railing															
Replace Rubber Interior Stairs			1,637												
C30 Interior Finishes															
Clean & Seal Concrete, Interior Wall Finish			2,018				2,018				2,018				2,018
Finish Repaired Concrete Block, Painted, Interior Wall Finish														191	
Finish Repaired Concrete, Painted Ceiling														16	
Finish Repaired Metal, Painted Ceiling														13	
Finish Replaced Concrete Block, Painted, Interior Wall Finish														9,541	
Finish Replaced Concrete, Painted Ceiling														780	
Finish Replaced Metal, Painted Ceiling														654	
Finish Replaced Plaster Ceiling														1,373	
Finish Replaced Plaster, Interior Wall Finish														837	
Refinish Concrete Block, Painted, Interior Wall Finish									9,541						
Refinish Concrete, Painted Ceiling									780						
Refinish Metal, Painted Ceiling									654						
Refinish Plaster Ceiling									1,373						
Refinish Plaster, Interior Wall Finish									837						
Repair (2% of Carpet) Carpet, Nylon, High Traffic, 20 oz		88		88		88				88		88		88	
Repair (2% of Ceiling) Concrete, Painted Ceiling														315	
Repair (2% of Ceiling) Metal, Painted Ceiling														276	
Repair (2% of Floors) Concrete Flooring														184	
Repair (2% of Floors) Vinyl Tile Flooring			58									58			
Repair (2% of Grating) Metal Floor Grating									57						
Repair (2% of Walls) Concrete Block, Painted, Interior Wall Finish														1,869	
Repair (2% of Walls) Concrete, Interior Wall Finish														597	
Repair (2% of Walls) Plastic, Fiberglass Reinforced, Interior Wall Panels					3										3
Repair (2% of Walls) Wallpaper, Interior Wall Finish	10								10						
Repair Acoustical Tile, Dropped Ceiling - JE					29										29

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - ATCT

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Repair Metal, Painted, Interior Stairs														1,568	
Replace Metal, Painted, Exterior Railing														10,077	
Replace Rubber Interior Stairs						1,637									
C30 Interior Finishes															
Clean & Seal Concrete, Interior Wall Finish				2,018				2,018				2,018			
Finish Repaired Concrete Block, Painted, Interior Wall Finish															
Finish Repaired Concrete, Painted Ceiling															
Finish Repaired Metal, Painted Ceiling															
Finish Replaced Concrete Block, Painted, Interior Wall Finish															
Finish Replaced Concrete, Painted Ceiling															
Finish Replaced Metal, Painted Ceiling															
Finish Replaced Plaster Ceiling															
Finish Replaced Plaster, Interior Wall Finish															
Refinish Concrete Block, Painted, Interior Wall Finish				9,541										9,541	
Refinish Concrete, Painted Ceiling				780										780	
Refinish Metal, Painted Ceiling				654										654	
Refinish Plaster Ceiling									1,373						
Refinish Plaster, Interior Wall Finish									837						
Repair (2% of Carpet) Carpet, Nylon, High Traffic, 20 oz			88		88		88				88		88		88
Repair (2% of Ceiling) Concrete, Painted Ceiling															
Repair (2% of Ceiling) Metal, Painted Ceiling															
Repair (2% of Floors) Concrete Flooring														184	
Repair (2% of Floors) Vinyl Tile Flooring												58			
Repair (2% of Grating) Metal Floor Grating				57										57	
Repair (2% of Walls) Concrete Block, Painted, Interior Wall Finish															
Repair (2% of Walls) Concrete, Interior Wall Finish															
Repair (2% of Walls) Plastic, Fiberglass Reinforced, Interior Wall Panels															3
Repair (2% of Walls) Wallpaper, Interior Wall Finish		10											10		
Repair Acoustical Tile, Dropped Ceiling - JE															29

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - ATCT

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Replace Acoustical Tile, Dropped Ceiling - JE															
Replace Cab Glass Shades - JE								8,693		8,693					
Replace Carpet, Nylon, High Traffic, 20 oz								4,396							
Replace Plaster Ceiling														11,865	
Replace Plaster, Interior Wall Finish														9,464	
Replace Plastic, Fiberglass Reinforced, Interior Wall Panels															
Replace Vinyl Tile Flooring															
Replace Wallpaper, Interior Wall Finish															
Repoint (50% of Surface) Concrete Block, Painted, Interior Wall Finish														18,971	
D10 Conveying															
Maintain Elevator, Geared, 6-15 Floor, 3,500 Lbs, 350 fpm	3,581	3,581	3,581	3,581	3,581	3,581	3,581	3,581	3,581	3,581	3,581	3,581	3,581		3,581
Renovate Elevator, Geared, 6-15 Floor, 3,500 Lbs, 350 fpm														123,125	
D20 Plumbing															
Check & Adjust Air Compressor, 2.000 HP	209	209	209	209	209	209	209	209	209	209	209	209	209		209
Check & Adjust Compressed Air Dryer	124	124	124	124	124		124	124	124	124	124	124	124	124	124
Drain & Flush Water Heater, Electric, 5 Gal						52									52
Install Gasket in Spud Connection Flush Tank Water Closet, One Piece															
Install New Gasket & Bolts Pipe & Fittings, 1" Steel - JE														11	
Install New Gasket & Bolts Pipe & Fittings, 2" Steel - JE														12	
Maintain Floor Drain	195	195	195	195	195	195	195	195	195	195	195	195	195	195	195
Maintain, 12 Month Roof Drain, 2.00 In	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
Maintain, 12 Month Sump Pump, 0.500 HP	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59
Maintain, 12 Month Water Heater, Electric, 5 Gal	38	38	38	38	38	38	38		38	38	38	38	38	38	38
Maintain, 12 Month Water Heater, Instant Hot, 120 Gph	38	38	38	38	38	38	38	38	38	38	38	38	38		38
Maintain, 3 Month Sump Pump, 0.500 HP	208	208	208	208	208	208	208	208	208	208	208	208	208	208	208
Maintain, 6 Month Roof Drain, 2.00 In	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140
Maintain, 6 Month Sump Pump, 0.500 HP	114	114	114	114	114	114	114	114	114	114	114	114	114	114	114
Maintain, 6 Month Water Heater, Electric, 5 Gal	114	114	114	114	114	114	114		114	114	114	114	114	114	114
Maintain, 6 Month Water Heater, Instant Hot, 120 Gph	114	114	114	114	114	114	114	114	114	114	114	114	114		114

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - ATCT

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Replace Acoustical Tile, Dropped Ceiling - JE					1,445										
Replace Cab Glass Shades - JE			8,693		8,693								8,693		8,693
Replace Carpet, Nylon, High Traffic, 20 oz	4,396								4,396						
Replace Plaster Ceiling															
Replace Plaster, Interior Wall Finish															
Replace Plastic, Fiberglass Reinforced, Interior Wall Panels					145										
Replace Vinyl Tile Flooring			3,666												
Replace Wallpaper, Interior Wall Finish					480										
Repoint (50% of Surface) Concrete Block, Painted, Interior Wall Finish															
D10 Conveying															
Maintain Elevator, Geared, 6-15 Floor, 3,500 Lbs, 350 fpm	3,581	3,581	3,581	3,581	3,581	3,581	3,581	3,581	3,581	3,581	3,581	3,581	3,581	3,581	3,581
Renovate Elevator, Geared, 6-15 Floor, 3,500 Lbs, 350 fpm															
D20 Plumbing															
Check & Adjust Air Compressor, 2.000 HP	209	209	209	209	209	209	209	209	209	209	209	209	209	209	209
Check & Adjust Compressed Air Dryer	124	124	124	124	124		124	124	124	124	124	124	124	124	124
Drain & Flush Water Heater, Electric, 5 Gal							52								52
Install Gasket in Spud Connection Flush Tank Water Closet, One Piece	14														
Install New Gasket & Bolts Pipe & Fittings, 1" Steel - JE															
Install New Gasket & Bolts Pipe & Fittings, 2" Steel - JE															
Maintain Floor Drain	195	195	195		195	195	195	195	195	195	195	195	195	195	195
Maintain, 12 Month Roof Drain, 2.00 In	11	11	11	11	11	11	11	11	11	11		11	11	11	11
Maintain, 12 Month Sump Pump, 0.500 HP		59	59	59	59	59	59	59	59	59	59	59	59	59	59
Maintain, 12 Month Water Heater, Electric, 5 Gal	38	38	38	38	38	38	38		38	38	38	38	38	38	38
Maintain, 12 Month Water Heater, Instant Hot, 120 Gph	38	38	38	38	38	38	38	38	38	38	38	38	38		38
Maintain, 3 Month Sump Pump, 0.500 HP		208	208	208	208	208	208	208	208	208	208	208	208	208	208
Maintain, 6 Month Roof Drain, 2.00 In	140	140	140	140	140	140	140	140	140	140		140	140	140	140
Maintain, 6 Month Sump Pump, 0.500 HP		114	114	114	114	114	114	114	114	114	114	114	114	114	114
Maintain, 6 Month Water Heater, Electric, 5 Gal	114	114	114	114	114	114	114		114	114	114	114	114	114	114
Maintain, 6 Month Water Heater, Instant Hot, 120 Gph	114	114	114	114	114	114	114	114	114	114	114	114	114		114

All costs expressed in ($) 2019

M&R Cost by Task per Year

JACOBS

Facility: TUL - Tulsa, OK **City:** Tulsa, OK
Building: TUL - ATCT

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Overhaul Sump Pump, 0.500 HP	97					97					97				
Recharge Compressed Air Dryer	50										50				
Repack Gland Gate Valve, 3.00 In					91										
Repair Air Compressor, 2.000 HP			672				672				672				
Repair Strainer Sink, Stainless Steel	80								80						
Replace 10' Section Pipe & Fittings, 1" Steel - JE											17				
Replace 10' Section Pipe & Fittings, 2" Cast Iron - JE											49				
Replace 10' Section Pipe & Fittings, 2" Steel - JE											27				
Replace 10' Section Pipe & Fittings, 4" Cast Iron - JE											72				
Replace Air Compressor, 2.000 HP														6,264	
Replace Compressed Air Dryer						5,533									
Replace Compressor Compressed Air Dryer	1,432														
Replace Coolant & Adjust Drinking Fountain, Refrigerated	38	38	38	38	38	38	38		38	38	38	38	38	38	38
Replace Coolant & Adjust Remote Water Chiller - JE	22		22				22		22		22		22		
Replace Drinking Fountain, Refrigerated								1,290							
Replace Faucet Washer & Clean Trap Lavatory, Vitreous China	13		13			13		13		13		13		13	
Replace Faucet Washer & Clean Trap Sink, Stainless Steel	26		26		26		26		26		26		26		26
Replace Floor Drain															
Replace Gate Valve, 3.00 In												1,132			
Replace Lavatory, Vitreous China				369											
Replace Pipe & Fittings, 2" Cast Iron - JE														4,925	
Replace Pipe & Fittings, 4" Cast Iron - JE														7,183	
Replace Pipe Insulation, Fiberglass, Cold Water - JE														1,051	
Replace Pump & Motor Assembly Sump Pump, 0.500 HP															
Replace Remote Water Chiller - JE					1,182										1,182
Replace Roof Drain, 2.00 In															
Replace Sink, Stainless Steel															
Replace Valve Hose Bib									79						
Replace Valve Set Lavatory, Vitreous China														101	

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - ATCT

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Overhaul Sump Pump, 0.500 HP						97					97				
Recharge Compressed Air Dryer	50										50				
Repack Gland Gate Valve, 3.00 In						91									
Repair Air Compressor, 2.000 HP			672				672				672				672
Repair Strainer Sink, Stainless Steel		80													
Replace 10' Section Pipe & Fittings, 1" Steel - JE								17							
Replace 10' Section Pipe & Fittings, 2" Cast Iron - JE											49				
Replace 10' Section Pipe & Fittings, 2" Steel - JE								27							
Replace 10' Section Pipe & Fittings, 4" Cast Iron - JE											72				
Replace Air Compressor, 2.000 HP															
Replace Compressed Air Dryer						5,533									
Replace Compressor Compressed Air Dryer	1,432														
Replace Coolant & Adjust Drinking Fountain, Refrigerated	38	38		38	38	38	38	38	38	38	38	38		38	38
Replace Coolant & Adjust Remote Water Chiller - JE		22		22		22		22				22		22	
Replace Drinking Fountain, Refrigerated			1,290										1,290		
Replace Faucet Washer & Clean Trap Lavatory, Vitreous China	13		13		13		13		13		13		13		13
Replace Faucet Washer & Clean Trap Sink, Stainless Steel		26		26		26		26				26		26	
Replace Floor Drain				1,274											
Replace Gate Valve, 3.00 In														1,132	
Replace Lavatory, Vitreous China															
Replace Pipe & Fittings, 2" Cast Iron - JE															
Replace Pipe & Fittings, 4" Cast Iron - JE															
Replace Pipe Insulation, Fiberglass, Cold Water - JE															
Replace Pump & Motor Assembly Sump Pump, 0.500 HP	715														
Replace Remote Water Chiller - JE										1,182					
Replace Roof Drain, 2.00 In											1,124				
Replace Sink, Stainless Steel										1,220					
Replace Valve Hose Bib				79										79	
Replace Valve Set Lavatory, Vitreous China									101						

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - ATCT

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Replace Valve Set Sink, Stainless Steel					202										202
Replace Washer & Spud Connection Lavatory, Vitreous China											29				
Replace Washer in Ball Cock Flush Tank Water Closet, One Piece	19					19					19				
Replace Water Heater, Electric, 5 Gal								813							
Replace Water Heater, Instant Hot, 120 Gph														532	
Replace Worn Parts Flush Tank Water Closet, One Piece											57				
Re-tape Pipe Insulation, Fiberglass, Cold Water - JE				62					62						
D30 HVAC															
Clean Fire Box Boiler, Gas, 750 Mbh	136		136		136		136		136		136		136		136
Inspect & Lubricate Circulator Pump, 1 HP, Hot Water - JE	43	43	43	43	43	43	43	43	43	43		43	43	43	43
Inspect & Maintain Metasys Controllers - JE	56	56	56	56	56	56	56		56	56	56	56	56	56	56
Inspect & Test Boiler, Gas, 750 Mbh	1,113	1,113	1,113	1,113	1,113	1,113	1,113	1,113	1,113	1,113	1,113	1,113	1,113	1,113	1,113
Maintain Chiller, Reciprocal, Air-Cooled, 30.0 Ton	710	710	710	710	710	710	710	710	710	710	710	710	710	710	710
Maintain Circulation Pump, 2 HP, Hot Water - JE	80	80	80	80	80	40	80	80	80	80	80	80	80	40	80
Maintain Circulation Pump, Chiller & Condenser Water, 5.000 HP	168	168	168	168	168	168	168	168	168	168	168		168	168	168
Maintain Direct Digital Controls, System Points	489	489	489	489	489	489	489		489	489	489	489	489	489	489
Maintain Exhaust Fan, Bathroom 150 cfm - JE	62	62	62	62	62	62	62	62	62	62	62	62	62		62
Maintain Expansion Tank, 100 Gal	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62
Maintain Expansion Tank, 30 Gal	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
Maintain Expansion Tank, 60 Gal	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
Maintain Residential Type Ceiling Fan	15	15	15		15	15	15	15	15	15	15	15	15	15	15
Maintain, 1 Month Chiller, Reciprocal, Air-Cooled, 30.0 Ton	744	744	744	744	744	744	744	744	744	744	744	744	744	744	744
Maintain, 12 Month Air Handler, Multizone, 6,500 Cfm	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
Maintain, 12 Month Air Handler, Single Zone, 1,300 Cfm	634	634	634	634	634	634	634	634	634	634	634	634	634	634	634
Maintain, 12 Month Air Handler, Single Zone, 2,500 Cfm	634	634	634	634	634	634	634	634	634	634	634	634	634	634	
Maintain, 12 Month Check Valve, 4.00 In	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62
Maintain, 12 Month Chiller, Reciprocal, Air-Cooled, 30.0 Ton	176	176	176	176	176	176	176	176	176	176	176	176	176	176	176
Maintain, 12 Month Condenser, Air-Cooled, 3.0 Ton	105	105	105	105	105	105	105	105	105	105	105	105	105		105
Maintain, 12 Month Exhaust Fan, Propeller, 20,000 Cfm	64	64	64	64	64	64	64	64	64	64	64	64	64	64	

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - ATCT

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Replace Valve Set Sink, Stainless Steel															
Replace Washer & Spud Connection Lavatory, Vitreous China			29							29					
Replace Washer in Ball Cock Flush Tank Water Closet, One Piece	19					19					19				
Replace Water Heater, Electric, 5 Gal								813							
Replace Water Heater, Instant Hot, 120 Gph														532	
Replace Worn Parts Flush Tank Water Closet, One Piece											57				
Re-tape Pipe Insulation, Fiberglass, Cold Water - JE				62					62					62	
D30 HVAC															
Clean Fire Box Boiler, Gas, 750 Mbh		136		136		136		136		136				136	
Inspect & Lubricate Circulator Pump, 1 HP, Hot Water - JE	43	43	43	43	43	43	43	43	43	43		43	43	43	43
Inspect & Maintain Metasys Controllers - JE	56	56	56	56	56	56	56		56	56	56	56	56	56	56
Inspect & Test Boiler, Gas, 750 Mbh	1,113	1,113	1,113	1,113	1,113	1,113	1,113	1,113	1,113	1,113	1,113		1,113	1,113	1,113
Maintain Chiller, Reciprocal, Air-Cooled, 30.0 Ton	710	710	710		710	710	710	710	710	710	710	710	710	710	710
Maintain Circulation Pump, 2 HP, Hot Water - JE	80	80	80	80	40	80	80	80	80	80	80	80	40	80	80
Maintain Circulation Pump, Chiller & Condenser Water, 5.000 HP	168	168	168	168	168	168	168	168	168	168	168	168	168		168
Maintain Direct Digital Controls, System Points	489	489		489	489	489	489	489	489	489	489	489		489	489
Maintain Exhaust Fan, Bathroom 150 cfm - JE	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62
Maintain Expansion Tank, 100 Gal	62	62	62	62	62	62	62	62	62	62	62	62	31	62	62
Maintain Expansion Tank, 30 Gal	31	31	31	31	31	31	31	31	31	31	31	31		31	31
Maintain Expansion Tank, 60 Gal	31	31	31	31	31	31	31	31	31	31	31	31		31	31
Maintain Residential Type Ceiling Fan	15	15	15	15	15	15	15		15	15	15	15	15	15	15
Maintain, 1 Month Chiller, Reciprocal, Air-Cooled, 30.0 Ton	744	744	744		744	744	744	744	744	744	744	744	744	744	744
Maintain, 12 Month Air Handler, Multizone, 6,500 Cfm		400	400	400	400	400	400	400	400	400	400	400	400	400	400
Maintain, 12 Month Air Handler, Single Zone, 1,300 Cfm		634	634	634	634	634	634	634	634	634	634	634	634	634	634
Maintain, 12 Month Air Handler, Single Zone, 2,500 Cfm	634	634	634	634	634	634	634	634	634	634	634	634	634	634	634
Maintain, 12 Month Check Valve, 4.00 In	62	41	21	62	62	62	62	62	62	62	62	62	62	62	62
Maintain, 12 Month Chiller, Reciprocal, Air-Cooled, 30.0 Ton	176	176	176		176	176	176	176	176	176	176	176	176	176	176
Maintain, 12 Month Condenser, Air-Cooled, 3.0 Ton	105	105	105	105	105	105	105	105	105	105	105	105	105	105	105
Maintain, 12 Month Exhaust Fan, Propeller, 20,000 Cfm	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64

All costs expressed in ($) 2019

M&R Cost by Task per Year

JACOBS

Facility: TUL - Tulsa, OK **City:** Tulsa, OK
Building: TUL - ATCT

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Maintain, 3 Month Air Handler, Multizone, 6,500 Cfm	204	204	204	204	204	204	204	204	204	204	204	204	204	204	204
Maintain, 3 Month Air Handler, Single Zone, 1,300 Cfm	536	536	536	536	536	536	536	536	536	536	536	536	536	536	536
Maintain, 3 Month Air Handler, Single Zone, 2,500 Cfm	536	536	536	536	536	536	536	536	536	536	536	536	536	536	
Maintain, 3 Month Chiller, Reciprocal, Air-Cooled, 30.0 Ton	248	248	248	248	248	248	248	248	248	248	248	248	248	248	248
Maintain, 3 Month Condenser, Air-Cooled, 3.0 Ton	624	624	624	624	624	624	624	624	624	624	624	624	624		624
Maintain, 6 Month Air Conditioner, Window, 1.0 Ton	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206
Maintain, 6 Month Air Conditioner, Window, 2.0 Ton	412	412	412	412	412	412	412	412	412	412	412	206	412	412	412
Maintain, 6 Month Chiller, Reciprocal, Air-Cooled, 30.0 Ton	164	164	164	164	164	164	164	164	164	164	164	164	164	164	164
Maintain, 6 Month Condenser, Air-Cooled, 3.0 Ton	66	66	66	66	66	66	66	66	66	66	66	66	66		66
Maintain, 6 Month Exhaust Fan, Propeller, 20,000 Cfm	172	172	172	172	172	172	172	172	172	172	172	172	172	172	
Maintain, 6 Month Exhaust Fan, Roof Mounted, 1,500 Cfm	258	258	258	258	258	258	258	258	258	258	258	258	258	258	258
Maintain, 6 Month Exhaust Fan, Roof Mounted, 2,000 Cfm	258	258	258	258	258	258	258	258	258	258	258	258	258	258	
Maintain, 6 Month Steel Damper, Motorized	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136
Minor Repair Metasys Controllers - JE			580										580		
Overhaul Circulator Pump, 1 HP, Hot Water - JE	172					172									
Refinish Steel Damper, Motorized					31										31
Repair Air Conditioner, Window, 1.0 Ton						107									
Repair Air Conditioner, Window, 2.0 Ton	109								109						
Repair Air Handler, Multizone, 6,500 Cfm								1,993							
Repair Air Handler, Single Zone, 1,300 Cfm							2,834								
Repair Air Handler, Single Zone, 2,500 Cfm									2,870						
Repair Boiler, Gas, 750 Mbh				6,118							6,118				
Repair Chiller, Reciprocal, Air-Cooled, 30.0 Ton								22,640							
Repair Circulation Pump, 2 HP, Hot Water - JE			98		98					98	98				
Repair Circulation Pump, Chiller & Condenser Water, 5.000 HP		93						93							
Repair Condenser, Air-Cooled, 3.0 Ton									1,416						
Repair Exhaust Fan, Bathroom 150 cfm - JE						162									
Repair Exhaust Fan, Propeller, 20,000 Cfm										342					
Repair Exhaust Fan, Roof Mounted, 1,500 Cfm								197							

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - ATCT

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Maintain, 3 Month Air Handler, Multizone, 6,500 Cfm		204	204	204	204	204	204	204	204	204	204	204	204	204	204
Maintain, 3 Month Air Handler, Single Zone, 1,300 Cfm		536	536	536	536	536	536	536	536	536	536	536	536	536	536
Maintain, 3 Month Air Handler, Single Zone, 2,500 Cfm	536	536	536	536	536	536	536	536	536	536	536	536	536	536	536
Maintain, 3 Month Chiller, Reciprocal, Air-Cooled, 30.0 Ton	248	248	248		248	248	248	248	248	248	248	248	248	248	248
Maintain, 3 Month Condenser, Air-Cooled, 3.0 Ton	624	624	624	624	624	624	624	624	624	624	624	624	624	624	624
Maintain, 6 Month Air Conditioner, Window, 1.0 Ton	206		206	206	206	206	206	206	206	206	206	206	206	206	206
Maintain, 6 Month Air Conditioner, Window, 2.0 Ton	412	412	412	412	206	412	412	412	412	412	412	412	412	412	412
Maintain, 6 Month Chiller, Reciprocal, Air-Cooled, 30.0 Ton	164	164	164		164	164	164	164	164	164	164	164	164	164	164
Maintain, 6 Month Condenser, Air-Cooled, 3.0 Ton	66	66	66	66	66	66	66	66	66	66	66	66	66	66	66
Maintain, 6 Month Exhaust Fan, Propeller, 20,000 Cfm	172	172	172	172	172	172	172	172	172	172	172	172	172	172	172
Maintain, 6 Month Exhaust Fan, Roof Mounted, 1,500 Cfm		258	258	258	258	258	258	258	258	258	258	258	258	258	258
Maintain, 6 Month Exhaust Fan, Roof Mounted, 2,000 Cfm	258	258	258	258	258	258	258	258	258	258	258	258	258	258	258
Maintain, 6 Month Steel Damper, Motorized	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136
Minor Repair Metasys Controllers - JE			580										580		
Overhaul Circulator Pump, 1 HP, Hot Water - JE	172					172									
Refinish Steel Damper, Motorized										31					
Repair Air Conditioner, Window, 1.0 Ton													107		
Repair Air Conditioner, Window, 2.0 Ton								109							
Repair Air Handler, Multizone, 6,500 Cfm											1,993				
Repair Air Handler, Single Zone, 1,300 Cfm											2,834				
Repair Air Handler, Single Zone, 2,500 Cfm										2,870					
Repair Boiler, Gas, 750 Mbh			6,118							6,118					
Repair Chiller, Reciprocal, Air-Cooled, 30.0 Ton															22,640
Repair Circulation Pump, 2 HP, Hot Water - JE	98			98					98	98					98
Repair Circulation Pump, Chiller & Condenser Water, 5.000 HP			93						93						
Repair Condenser, Air-Cooled, 3.0 Ton											1,416				
Repair Exhaust Fan, Bathroom 150 cfm - JE										162					
Repair Exhaust Fan, Propeller, 20,000 Cfm											342				
Repair Exhaust Fan, Roof Mounted, 1,500 Cfm												197			

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - ATCT

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Repair Exhaust Fan, Roof Mounted, 2,000 Cfm					197										
Replace 10' Section Pipe & Fittings, 2" Steel - JE											107				
Replace Air Conditioner, Window, 1.0 Ton															
Replace Air Conditioner, Window, 2.0 Ton												1,454			
Replace Air Handler, Multizone, 6,500 Cfm															
Replace Air Handler, Single Zone, 1,300 Cfm															
Replace Air Handler, Single Zone, 2,500 Cfm															15,293
Replace Ball Valve, 2.00 In															3,441
Replace Boiler, Gas, 750 Mbh															
Replace Calibrated Balancing Valve, 2.00 In												312			
Replace Check Valve, 4.00 In															
Replace Chemical Bypass Pot Feeder - JE															
Replace Chiller, Reciprocal, Air-Cooled, 30.0 Ton															
Replace Circulation Pump, 2 HP, Hot Water - JE						4,707								4,707	
Replace Circulation Pump, Chiller & Condenser Water, 5.000 HP												4,578			
Replace Circulator Pump, 1 HP, Hot Water - JE											8,952				
Replace Condenser, Air-Cooled, 3.0 Ton														3,934	
Replace Direct Digital Controls, System Points								13,900							
Replace Duct Insulation, Fiberglass - JE									4,572						
Replace Ductwork - JE									10,577						
Replace Exhaust Fan, Bathroom 150 cfm - JE														250	
Replace Exhaust Fan, Propeller, 20,000 Cfm															2,673
Replace Exhaust Fan, Roof Mounted, 1,500 Cfm															
Replace Exhaust Fan, Roof Mounted, 2,000 Cfm															1,213
Replace Expansion Tank, 100 Gal															
Replace Expansion Tank, 30 Gal															
Replace Expansion Tank, 60 Gal															
Replace Flow Control Valve, Motorized, 2.00 In															
Replace Metasys Controllers - JE								3,429							

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - ATCT

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Repair Exhaust Fan, Roof Mounted, 2,000 Cfm											197				
Replace 10' Section Pipe & Fittings, 2" Steel - JE											107				
Replace Air Conditioner, Window, 1.0 Ton		1,313													
Replace Air Conditioner, Window, 2.0 Ton					1,454										
Replace Air Handler, Multizone, 6,500 Cfm	19,465														
Replace Air Handler, Single Zone, 1,300 Cfm	12,318														
Replace Air Handler, Single Zone, 2,500 Cfm															
Replace Ball Valve, 2.00 In															3,441
Replace Boiler, Gas, 750 Mbh												30,931			
Replace Calibrated Balancing Valve, 2.00 In														312	
Replace Check Valve, 4.00 In		2,008	4,015												
Replace Chemical Bypass Pot Feeder - JE			1,073												
Replace Chiller, Reciprocal, Air-Cooled, 30.0 Ton				48,313											
Replace Circulation Pump, 2 HP, Hot Water - JE					4,707								4,707		
Replace Circulation Pump, Chiller & Condenser Water, 5.000 HP														4,578	
Replace Circulator Pump, 1 HP, Hot Water - JE											8,952				
Replace Condenser, Air-Cooled, 3.0 Ton															
Replace Direct Digital Controls, System Points			13,900										13,900		
Replace Duct Insulation, Fiberglass - JE															
Replace Ductwork - JE															
Replace Exhaust Fan, Bathroom 150 cfm - JE															
Replace Exhaust Fan, Propeller, 20,000 Cfm															
Replace Exhaust Fan, Roof Mounted, 1,500 Cfm	1,177														
Replace Exhaust Fan, Roof Mounted, 2,000 Cfm															
Replace Expansion Tank, 100 Gal													2,590		
Replace Expansion Tank, 30 Gal													1,812		
Replace Expansion Tank, 60 Gal													2,154		
Replace Flow Control Valve, Motorized, 2.00 In							3,474								
Replace Metasys Controllers - JE								3,429							

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - ATCT

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Replace Pipe & Fittings, 2" Steel - JE														10,660	
Replace Pipe Insulation, Fiberglass, Chilled Water - JE														1,113	
Replace Pipe Insulation, Fiberglass, Heating Water/Steam - JE														1,671	
Replace Residential Type Ceiling Fan				239											
Replace Valve Actuator Flow Control Valve, Motorized, 2.00 In						1,693									
Re-tape Pipe Insulation, Fiberglass, Chilled Water - JE				319					319						
Re-tape Pipe Insulation, Fiberglass, Heating Water/Steam - JE				336					336						
D40 Fire Protection															
Inspect & Maintain Fire Annunciator Panel - JE	31	31	31	31	31	31	31		31	31	31	31	31	31	31
Inspect & Test Fire Alarm Control Panel	126	126	126	126	126	126	126		126	126	126	126	126	126	126
Inspect & Test Fire Extinguisher	51	51	51	51		51	51	51	51	51	51	51	51	51	51
Inspect & Test Kitchen Fire Suppression System (CO2)	398	398	398	398	398	398	398	398	398	398	398	398		398	398
Maintain, 1 Month Fire Extinguisher	768	768	768	768		768	768	768	768	768	768	768	768	768	768
Maintain, 12 Month Fire Extinguisher	45	45	45	45		45	45	45	45	45	45	45	45	45	45
Repair Fire Alarm Control Panel			95										95		
Replace Fire Alarm Control Panel								2,842							
Replace Fire Annunciator Panel - JE								889							
Replace Fire Extinguisher					4,929										
Replace Kitchen Fire Suppression System (CO2)													2,441		
D50 Electrical															
Annual PM Circuit Breaker, 15/20 Amp. - JE	59	59	59	59	57	59	59	58	59	59	59	59	59	59	53
Check & Adjust Manual Pull Station			498												
Check Operation Smoke Detector, Duct	60	60	60	60	60	60	60		60	60	60	60	60	60	60
Inspect & Clean Motor Starter, 10.000 HP, 208 V	41	41	41	41	41	41	41	41	41	41	41	41		41	41
Inspect & Clean Motor Starter, 2.000 HP, 208 V	206	206	165	206	206	206	206	206	206	206	206	206	206	41	206
Maintain & Repair General Wiring Lightning Protection - JE	15	15	15	15	15	15	15	15	15	15	15	15	15		15
Maintain Card Reader	708	708	708	708		708	708	708	708	708	708	708	708	708	
Maintain Circuit Breaker, 3 Ph., 600 V, 100 Amp	503	503	503	503	503	503	503	503	503	503	503	503	503	503	443
Maintain Circuit Breaker, 3 Ph., 600 V, 60 Amp	2,155	2,155	2,155	2,155	2,066	2,155	2,155	1,948	2,155	2,155	2,155	2,155	2,155	2,155	2,125

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - ATCT

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Replace Pipe & Fittings, 2" Steel - JE															
Replace Pipe Insulation, Fiberglass, Chilled Water - JE															
Replace Pipe Insulation, Fiberglass, Heating Water/Steam - JE															
Replace Residential Type Ceiling Fan								239							
Replace Valve Actuator Flow Control Valve, Motorized, 2.00 In					1,693										
Re-tape Pipe Insulation, Fiberglass, Chilled Water - JE				319					319					319	
Re-tape Pipe Insulation, Fiberglass, Heating Water/Steam - JE				336					336					336	
D40 Fire Protection															
Inspect & Maintain Fire Annunciator Panel - JE	31	31	31	31	31	31	31		31	31	31	31	31	31	31
Inspect & Test Fire Alarm Control Panel	126	126	126	126	126	126	126		126	126	126	126	126	126	126
Inspect & Test Fire Extinguisher	51		51	51	51	51	51	51	51	51	51	51	51		51
Inspect & Test Kitchen Fire Suppression System (CO2)	398	398	398	398	398	398	398	398	398	398	398	398	398	398	398
Maintain, 1 Month Fire Extinguisher	768		768	768	768	768	768	768	768	768	768	768	768		768
Maintain, 12 Month Fire Extinguisher	45		45	45	45	45	45	45	45	45	45	45	45		45
Repair Fire Alarm Control Panel			95										95		
Replace Fire Alarm Control Panel								2,842							
Replace Fire Annunciator Panel - JE								889							
Replace Fire Extinguisher		4,929												4,929	
Replace Kitchen Fire Suppression System (CO2)															
D50 Electrical															
Annual PM Circuit Breaker, 15/20 Amp. - JE	59	59	59	59	59	59	59	59	59	59	59	59	59	9	59
Check & Adjust Manual Pull Station			498												
Check Operation Smoke Detector, Duct	60	60	60	60	60	60	60		60	60	60	60	60	60	60
Inspect & Clean Motor Starter, 10.000 HP, 208 V	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41
Inspect & Clean Motor Starter, 2.000 HP, 208 V	206	206	206	206	206	165	206	206	206	206	206	206	206	206	206
Maintain & Repair General Wiring Lightning Protection - JE	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
Maintain Card Reader	708	708	708	708	708	708	708	708	708		708	708	708	708	708
Maintain Circuit Breaker, 3 Ph., 600 V, 100 Amp	503	503	503	473	503	503	503	503	503	503	503	503	503	503	503
Maintain Circuit Breaker, 3 Ph., 600 V, 60 Amp	2,155	2,155	2,155	1,978	2,155	2,155	2,155	2,155	2,155	2,155	2,155	2,155	2,155	2,155	2,155

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - ATCT

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Maintain Circuit Breaker, 600 V, 400 Amp	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89
Maintain Disconnect Switch, 100 Amp	275	275	275	275	275	275	275	275	275	275	275	275	275	275	275
Maintain Disconnect Switch, 200 Amp	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138
Maintain Disconnect Switch, 30 Amp	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69
Maintain Disconnect Switch, 60 Amp	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138
Maintain Intercom Speaker	30	30	30	30		30	30	30	30	30	30	30	30	30	30
Maintain Intrusion Detection Motion Detector, Interior	30	30	30	30		30	30	30	30	30	30	30	30	30	
Maintain Motion Sensing Wall Switch	4	4	4	4		4	4	4	4	4	4	4	4	4	
Maintain Power Panel Board, 208 Y, 120 V, 100 Amp	621	621	621	621	552	621	621	483	621	621	621	621	621	621	483
Maintain Power Panel Board, 208 Y, 120 V, 225 Amp	207	207	207	207	207	207	207	207	207	207	207	207	207	207	207
Maintain Power Panel Board, 208 Y, 120 V, 400 Amp	137	137	137	137	137	137	137	137	137	137	137	137	137	137	137
Maintain Secondary Transformer, Dry, 15 kVA	108	108	108	108	108	108	108	108	108	108	108	108	108	108	
Maintain Secondary Transformer, Dry, 150 kVA	78	78	78	78	78	78	78	78	78	78	78	78	78	78	
Maintain Secondary Transformer, Dry, 30 kVA	324	324	324	324	324	324	324	324	324	324	324	324	324	324	
Maintain Transient Voltage Surge Suppression Panel	104	104	104	104	104	104	104	104	104	104	104	104	104	104	
Maintain, 12 Month Secondary Transformer, Dry, 150 kVA	78	78	78	78	78	78	78	78	78	78	78	78	78	78	
Maintain, 36 Month Secondary Transformer, Dry, 150 kVA			22			22			22			22			
Repair Circuit Breaker, 15/20 Amp. - JE					171				1,325						47
Repair Circuit Breaker, 3 Ph., 600 V, 100 Amp					882				6,611						
Repair Circuit Breaker, 3 Ph., 600 V, 60 Amp					441				27,323						1,322
Repair Circuit Breaker, 600 V, 400 Amp									1,322						
Repair Disconnect Switch, 100 Amp					301			100							301
Repair Disconnect Switch, 200 Amp							106	106							
Repair Disconnect Switch, 30 Amp							82								
Repair Disconnect Switch, 60 Amp					86				86						86
Repair Power Panel Board, 208 Y, 120 V, 100 Amp					136				272						68
Repair Power Panel Board, 208 Y, 120 V, 225 Amp									204						
Repair Power Panel Board, 208 Y, 120 V, 400 Amp										137					
Repair Secondary Transformer, Dry, 15 kVA					319										

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - ATCT

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Maintain Circuit Breaker, 600 V, 400 Amp	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89
Maintain Disconnect Switch, 100 Amp	275	275	275	275	275	275	275	275	275	275	275	275	206	275	275
Maintain Disconnect Switch, 200 Amp	138	138	138	138	138	138	138	138	138	138	138	138	69	138	138
Maintain Disconnect Switch, 30 Amp	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69
Maintain Disconnect Switch, 60 Amp	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138
Maintain Intercom Speaker	30	30	30	30	30	30	30	30	30		30	30	30	30	30
Maintain Intrusion Detection Motion Detector, Interior	30	30	30	30	30	30	30	30	30		30	30	30	30	30
Maintain Motion Sensing Wall Switch	4	4	4	4	4	4	4	4	4		4	4	4	4	4
Maintain Power Panel Board, 208 Y, 120 V, 100 Amp	621	621	621	621	621	621	621	621	621	621	621	621	621	345	621
Maintain Power Panel Board, 208 Y, 120 V, 225 Amp	207	207	207	207	207	207	207	207	207	207	207	207	207		207
Maintain Power Panel Board, 208 Y, 120 V, 400 Amp	137	137	137	137	137	137	137	137	137	137	137	137	137	137	
Maintain Secondary Transformer, Dry, 15 kVA	108	108	108	108	108	108	108	108	108	108	108	108	108	108	108
Maintain Secondary Transformer, Dry, 150 kVA	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78
Maintain Secondary Transformer, Dry, 30 kVA	324	324	324	324	324	324	324	324	324	324	324	324	324	324	324
Maintain Transient Voltage Surge Suppression Panel	104	104	104	104	104	104	104	104	104	104	104	104	104	104	104
Maintain, 12 Month Secondary Transformer, Dry, 150 kVA	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78
Maintain, 36 Month Secondary Transformer, Dry, 150 kVA			22			22			22			22			22
Repair Circuit Breaker, 15/20 Amp. - JE			23	1,325						218			23		
Repair Circuit Breaker, 3 Ph., 600 V, 100 Amp				6,170						882				6,611	
Repair Circuit Breaker, 3 Ph., 600 V, 60 Amp			3,085	24,679						1,763			3,085	27,323	
Repair Circuit Breaker, 600 V, 400 Amp				1,322										1,322	
Repair Disconnect Switch, 100 Amp			100							301					
Repair Disconnect Switch, 200 Amp		106	106									106			
Repair Disconnect Switch, 30 Amp		82										82			
Repair Disconnect Switch, 60 Amp				86						86				86	
Repair Power Panel Board, 208 Y, 120 V, 100 Amp			136	272						204			136		
Repair Power Panel Board, 208 Y, 120 V, 225 Amp				204											
Repair Power Panel Board, 208 Y, 120 V, 400 Amp					137										
Repair Secondary Transformer, Dry, 15 kVA										319					

All costs expressed in ($) 2019

M&R Cost by Task per Year

JACOBS

Facility: TUL - Tulsa, OK **City:** Tulsa, OK
Building: TUL - ATCT

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Repair Secondary Transformer, Dry, 150 kVA					319										
Repair Secondary Transformer, Dry, 30 kVA					957										
Repair Smoke Detector			588												
Repair Smoke Detector, Duct			118												
Repair Wiring Device, Switch									951						
Replace Ballast & Lamps Fluorescent Lighting Fixture, T12, 40 W									280						
Replace Ballast & Lamps Fluorescent Lighting Fixture, T12, 60 W									1,421						
Replace Ballast & Lamps Fluorescent Lighting Fixture, T8, 32 W															159
Replace Batteries & Check Operation Smoke Detector	258	258	258	258	258	258	258		258	258	258	258	258	258	258
Replace Card Reader					619										619
Replace Circuit Breaker, 15/20 Amp. - JE					180			90							659
Replace Circuit Breaker, 3 Ph., 600 V, 100 Amp															2,654
Replace Circuit Breaker, 3 Ph., 600 V, 60 Amp					3,608			8,419							1,203
Replace Coil Motor Starter, 10.000 HP, 208 V	217			217			217			217					
Replace Coil Motor Starter, 2.000 HP, 208 V		852			852	213		852	213		852	213			213
Replace Disconnect Switch, 100 Amp															
Replace Disconnect Switch, 200 Amp															
Replace Electronic Lock					213										213
Replace Emergency Lighting Pack, 2 Light w/ Battery					5,556										
Replace Exit Lighting Fixture, LED					1,193										
Replace Fire Alarm Horn & Strobe													2,201		
Replace Fluorescent Lighting Fixture, T12, 40 W															
Replace Fluorescent Lighting Fixture, T12, 60 W															
Replace Fluorescent Lighting Fixture, T8, 32 W					312										
Replace Grounded Fault Circuit Interrupter, 15 Amp															115
Replace Incandescent Lighting Fixture, Basic, 100 W					1,371										
Replace Intercom Speaker					442										
Replace Intrusion Detection Motion Detector, Interior					572										572
Replace Lamp Emergency Lighting Pack, 2 Light w/ Battery	351	351	351	351	117	351	351	351	351	351	351	351	351	351	351

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - ATCT

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Repair Secondary Transformer, Dry, 150 kVA										319					
Repair Secondary Transformer, Dry, 30 kVA										957					
Repair Smoke Detector			588												
Repair Smoke Detector, Duct			118												
Repair Wiring Device, Switch									951						
Replace Ballast & Lamps Fluorescent Lighting Fixture, T12, 40 W														280	
Replace Ballast & Lamps Fluorescent Lighting Fixture, T12, 60 W														1,421	
Replace Ballast & Lamps Fluorescent Lighting Fixture, T8, 32 W															
Replace Batteries & Check Operation Smoke Detector	258	258	258	258	258	258	258		258	258	258	258	258	258	258
Replace Card Reader										619					
Replace Circuit Breaker, 15/20 Amp. - JE														5,090	
Replace Circuit Breaker, 3 Ph., 600 V, 100 Amp				1,327											
Replace Circuit Breaker, 3 Ph., 600 V, 60 Amp				7,217											
Replace Coil Motor Starter, 10.000 HP, 208 V	217			217			217			217			217		
Replace Coil Motor Starter, 2.000 HP, 208 V		852	213		852			852	213		852	213		852	213
Replace Disconnect Switch, 100 Amp													1,511		
Replace Disconnect Switch, 200 Amp													1,484		
Replace Electronic Lock										213					
Replace Emergency Lighting Pack, 2 Light w/ Battery			2,778							5,556					
Replace Exit Lighting Fixture, LED										1,193					
Replace Fire Alarm Horn & Strobe															
Replace Fluorescent Lighting Fixture, T12, 40 W				624											
Replace Fluorescent Lighting Fixture, T12, 60 W				2,964											
Replace Fluorescent Lighting Fixture, T8, 32 W										312					
Replace Grounded Fault Circuit Interrupter, 15 Amp															
Replace Incandescent Lighting Fixture, Basic, 100 W				5,210						1,371					
Replace Intercom Speaker										442					
Replace Intrusion Detection Motion Detector, Interior										572					
Replace Lamp Emergency Lighting Pack, 2 Light w/ Battery	351	351	234	351	351	351	351	351	351	117	351	351	351	351	351

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - ATCT

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Replace Lamp Incandescent Lighting Fixture, Basic, 100 W				262					262	69				262	69
Replace Lamp LED Lighting Fixture, Basic, 20 W							45								
Replace LED Lighting Fixture, Basic, 20 W															
Replace LED Obstruction Light - JE															
Replace Lens Emergency Lighting Pack, 2 Light w/ Battery								70							139
Replace Lightning Protection - JE														623	
Replace Manual Pull Station								1,122							
Replace Motion Sensing Wall Switch					93										93
Replace Motor Starter, 10.000 HP, 208 V													1,631		
Replace Motor Starter, 2.000 HP, 208 V			683											2,733	
Replace Power Panel Board, 208 Y, 120 V, 100 Amp					3,809			7,618							7,618
Replace Power Panel Board, 208 Y, 120 V, 225 Amp															
Replace Power Panel Board, 208 Y, 120 V, 400 Amp															
Replace Receptacle, 120 V, 20 Amp															
Replace Remote Door Release System - JE								8,231							
Replace Secondary Transformer, Dry, 15 kVA															3,605
Replace Secondary Transformer, Dry, 150 kVA															11,859
Replace Secondary Transformer, Dry, 30 kVA															13,707
Replace Smoke Detector								2,532							
Replace Smoke Detector, Duct								1,684							
Replace Transient Voltage Surge Suppression Panel															2,410
Replace Wiring Device, Switch														1,075	
E10 Equipment															
Annual PM Central Vacuum System - JE	89	89	89	89	89	89	89	89	89	89	89	89	89	89	
Maintain Kitchen Exhaust Hood, Domestic - JE	39	39	39	39	39	39	39	39	39	39	39	39	39	39	
Maintain Refrigerator, Mini, 3 Cu Ft	28	28	28	28		28	28	28	28	28	28	28	28	28	
Maintain, 6 Month Dishwasher, Electric	486	486	486	486		486	486	486	486	486	486	486	486	486	
Maintain, 6 Month Disposal, Garbage, Electric	128	128	128	128		128	128	128	128	128	128	128	128	128	
Maintain, 6 Month Range/Oven	218	218	218	218		218	218	218	218	218	218	218	218	218	

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - ATCT

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Replace Lamp Incandescent Lighting Fixture, Basic, 100 W					69				262					262	69
Replace Lamp LED Lighting Fixture, Basic, 20 W												45			
Replace LED Lighting Fixture, Basic, 20 W		143													
Replace LED Obstruction Light - JE				1,529											
Replace Lens Emergency Lighting Pack, 2 Light w/ Battery													70		
Replace Lightning Protection - JE															
Replace Manual Pull Station								1,122							
Replace Motion Sensing Wall Switch										93					
Replace Motor Starter, 10.000 HP, 208 V															
Replace Motor Starter, 2.000 HP, 208 V						683									
Replace Power Panel Board, 208 Y, 120 V, 100 Amp														15,236	
Replace Power Panel Board, 208 Y, 120 V, 225 Amp														18,438	
Replace Power Panel Board, 208 Y, 120 V, 400 Amp															14,588
Replace Receptacle, 120 V, 20 Amp				5,991											
Replace Remote Door Release System - JE								8,231							
Replace Secondary Transformer, Dry, 15 kVA															
Replace Secondary Transformer, Dry, 150 kVA															
Replace Secondary Transformer, Dry, 30 kVA															
Replace Smoke Detector								2,532							
Replace Smoke Detector, Duct								1,684							
Replace Transient Voltage Surge Suppression Panel															
Replace Wiring Device, Switch														1,075	
E10 Equipment															
Annual PM Central Vacuum System - JE	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89
Maintain Kitchen Exhaust Hood, Domestic - JE	39	39	39	39	39	39	39	39	39	39	39	39	39	39	
Maintain Refrigerator, Mini, 3 Cu Ft	28	28	28	28	28	28	28	28	28		28	28	28	28	28
Maintain, 6 Month Dishwasher, Electric	486	486	486	486	486	486	486	486	486		486	486	486	486	486
Maintain, 6 Month Disposal, Garbage, Electric	128	128	128	128	128	128	128	128	128		128	128	128	128	128
Maintain, 6 Month Range/Oven	218	218	218	218	218	218	218	218	218		218	218	218	218	218

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - ATCT

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Replace Central Vacuum System - JE															3,602
Replace Dishwasher, Electric					5,259										5,259
Replace Disposal, Garbage, Electric					401										401
Replace Kitchen Exhaust Hood, Domestic - JE															481
Replace Range/Oven					4,594										4,594
Replace Refrigerator, Domestic			1,203										1,203		
Replace Refrigerator, Mini, 3 Cu Ft					325										325

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - ATCT

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Replace Central Vacuum System - JE															
Replace Dishwasher, Electric										5,259					
Replace Disposal, Garbage, Electric										401					
Replace Kitchen Exhaust Hood, Domestic - JE															481
Replace Range/Oven										4,594					
Replace Refrigerator, Domestic								1,203							
Replace Refrigerator, Mini, 3 Cu Ft										325					

All costs expressed in ($) 2019

Tab 3 Building Reports, Base Building
Average M&R Costs
Most Costly M&R Tasks
Yearly M&R Cost Profile Chart
Building Extended Component List with Remaining Service Life
Building Deferred Maintenance Detail
M&R Costs by System per Year Chart
M&R Costs by Task per Year

TUL - Base Building Average M&R Costs

JACOBS

Facility:	TUL - Tulsa, OK	**PRV:**	$4,753,845
City:	Tulsa, OK	**Build Date:**	1958
Building:	TUL - Base Building	**GSFT:**	10,060

M&R Average Annual Cost Forecasts

	Current Year	5 Year	10 year	20 year	30 Year
Preventive Maintenace:	$29,118	$28,026	$28,298	$28,133	$28,176
Unscheduled Maintenance:	$37,346	$36,510	$36,560	$36,463	$36,519
Repair:	$3,809	$14,505	$13,787	$16,876	$15,969
Replacement:	$513	$53,688	$64,455	$71,565	$72,476
Total M&R Costs:	$70,786	$132,728	$143,100	$153,038	$153,140
Per GSFT:	$7.04	$13.19	$14.22	$15.21	$15.22
As % of PRV:	1.49%	2.79%	3.01%	3.22%	3.22%

All cost expressed in ($) 2019

TUL - Base Building - Most Costly M&R Tasks

JACOBS

Building: TUL - Base Building
Facility: TUL - Tulsa, OK
City: Tulsa, OK

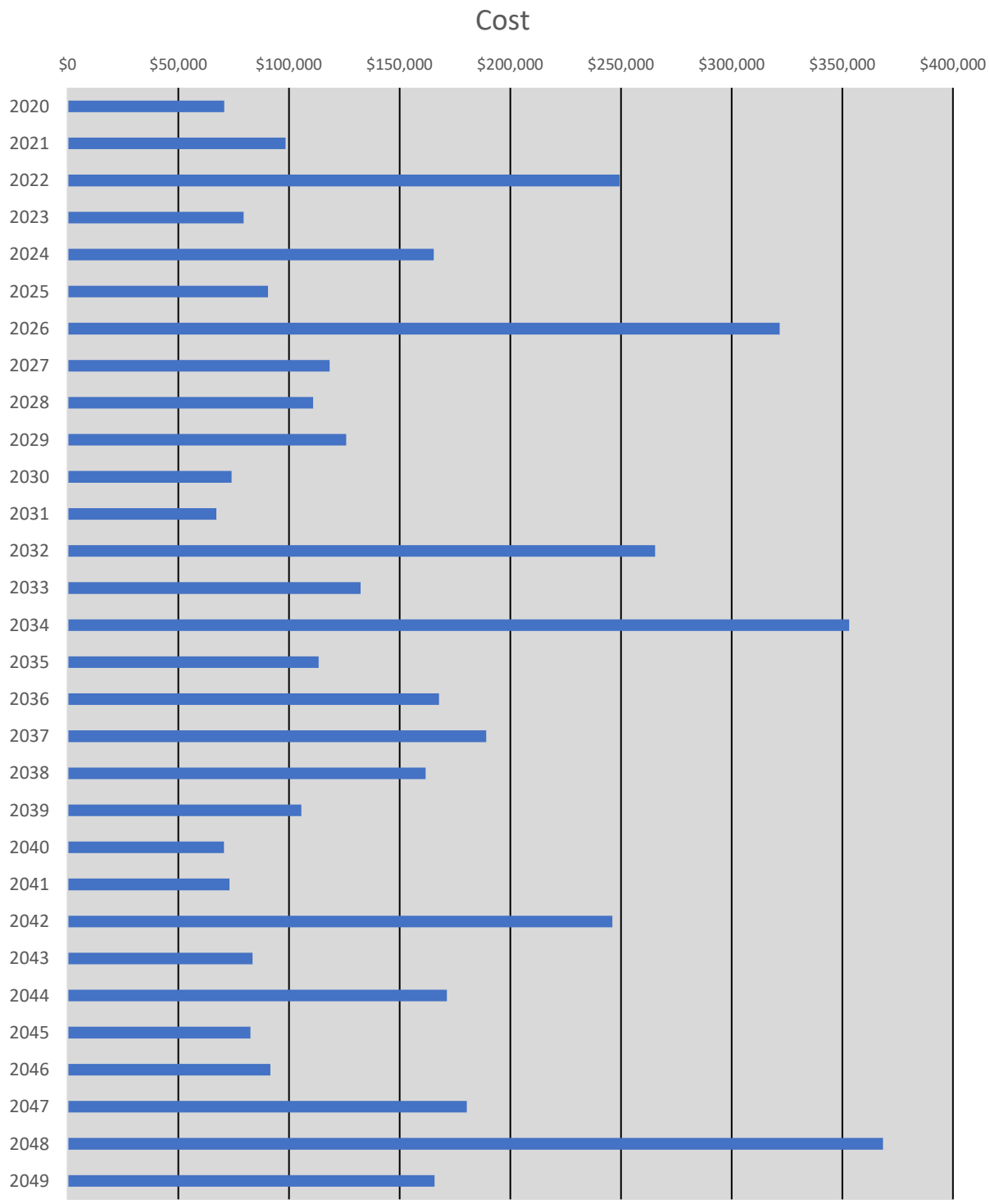
Average Built Date: 1958
30-Year Total M&R: $3,498,634
GSFT: 10,060

Task	30-Year Total Cost	Percent of Total M&R
Resurface Asphaltic Pavement, Parking Lot, >10,000 sq.ft - JE	$293,082	8.38%
Replace Air Conditioner, Computer Room, Air-Cooled (CRAC), 20.0 Ton	$258,656	7.39%
Replace Air Conditioner, Computer Room, Air-Cooled (CRAC), 15.0 Ton	$214,436	6.13%
Maintain Card Reader	$114,723	3.28%
Replace Single-Ply PVC Membrane Roof - JE	$98,504	2.82%
Replace Carpet on Access Flooring - JE	$63,318	1.81%
Replace Circuit Breaker, 600 V, 400 Amp	$55,564	1.59%
Replace Power Panel Board, 208 Y, 120 V, 225 Amp	$55,315	1.58%
Replace Chain Link Fence, 8 Ln Ft	$54,744	1.56%
Maintain Chain Link Fence, 8 Ln Ft	$54,375	1.55%
Replace Carpet, Nylon, High Traffic, 20 oz	$54,324	1.55%
Replace Condenser, Air-Cooled, 20.0 Ton	$50,695	1.45%
Repair Air Conditioner, Computer Room, Air-Cooled (CRAC), 20.0 Ton	$49,685	1.42%
Replace Security Control Panel	$48,932	1.40%
Repair Circuit Breaker, 3 Ph., 600 V, 60 Amp	$48,477	1.39%
Replace Kitchen Cabinet, Wood - JE	$43,530	1.24%
Inspect & Maintain Security Control Panel	$39,648	1.13%
Repair Air Conditioner, Computer Room, Air-Cooled (CRAC), 15.0 Ton	$39,181	1.12%
Maintain Circuit Breaker, 3 Ph., 600 V, 60 Amp	$37,539	1.07%
Repair Asphaltic Pavement, Parking Lot, >10,000 sq.ft - JE	$36,426	1.04%
Replace Concrete Sidewalk, 4" Thick - JE	$32,368	0.93%
Replace Plaster, Interior Wall Finish	$31,781	0.91%
Repair Circuit Breaker, 3 Ph., 600 V, 100 Amp	$31,288	0.89%
Replace Direct Digital Controls, System Points	$31,275	0.89%
Replace Air Handler, Multizone, 10,000 Cfm	$29,663	0.85%
Replace Circuit Breaker, 3 Ph., 600 V, 100 Amp	$29,185	0.83%
Maintain, 6 Month Air Conditioner, Computer Room, Air-Cooled (CRAC), 20.0 Ton	$28,224	0.81%
Replace Condenser, Air-Cooled, 15.0 Ton	$27,802	0.79%
Replace Range/Oven	$27,564	0.79%
Replace Air Handler, Single Zone, 5,000 Cfm	$26,972	0.77%
Maintain Circuit Breaker, 3 Ph., 600 V, 100 Amp	$26,830	0.77%

All costs expressed in ($) 2019

Building: TUL - Base Building

Facility: TUL - Tulsa, OK **City:** Tulsa, OK



All costs expressed in ($) 2019

Building Extended Component List with Remaining Service Life

JACOBS 2/18/2020

Building: TUL - Base Building
Facility: TUL - Tulsa, OK
City: Tulsa, OK

Last Inspection Date: 11/20/2019
Year Built: 1958
Replacement Value: $4,753,845 **per SF:** $473

Building Notes: Includes 6,100 SF 1972 Addition and 70 SF Link
Building Gsft: 10,060

Uniformat	Equip ID	Component	Install Year	Remaining Service Life	Quantity	Deferred Maintenance	Location	Note
B1020		Steel Roof Access Ladder	1972	-8	15 LnFt	$1,271		
B2010		Clay Brick, Exterior, 1 Story	1958	49	1,409 SqFt			
B2010		Clay Brick, Exterior, 1 Story	1972	49	3,763 SqFt			
B2010		Clay Brick, Exterior, 1 Story	1958	-1	160 SqFt	$3,607		Brick is cracked and not fully supported
B2020		Aluminum Fixed Window, 1 Story, 12 Sq Ft	1972	2	1 Each			Interior
B2020		Aluminum Fixed Window, 1 Story, 12 Sq Ft	1972	2	2 Each			Door Sidelights
B2020		Glass Curtain Wall	2015	-1	200 SqFt	$9,319	Link	Glass replaced in 2015, but frames are rusted extensively
B2030		Steel, Painted, Exterior Door	1958	13	1 Each			
B2030		Steel, Painted, Exterior Door	1972	27	3 Each			
B2030		Steel, Painted, Exterior Door	1972	-1	1 Each	$896		
B2030		Steel, Painted, Exterior Door	1972	-1	2 Each	$1,793	Link	
B3010		Flashing - JE	2016	16	467 LnFt			
B3010		Flashing - JE	2016	16	36 LnFt			
B3010		Metal Awning	1972	-18	60 SqFt	$583	Entrance	
B3010		Metal Awning	1987	-3	190 SqFt	$1,845	Link	
B3010		Metal Awning	2018	28	450 SqFt		Patio Area	
B3010		Single-Ply PVC Membrane Roof - JE	2016	16	72 SqFt		Link	TPO
B3010		Single-Ply PVC Membrane Roof - JE	2016	16	9,990 SqFt			TPO
C1010		Toilet Partitions - JE	2010	10	23 LnFt			
C1020		Steel, Painted, Interior Door	1958	13	1 Each			
C1020		Steel, Painted, Interior Door	1972	27	2 Each			
C1020		Steel, Painted, Interior Door	1988	43	1 Each			
C1020		Wood, Solid Core, Painted, Interior Door	1989	9	3 Each			
C1020		Wood, Solid Core, Painted, Interior Door	1958	-22	6 Each	$8,368		
C1020		Wood, Solid Core, Painted, Interior Door	2004	24	1 Each			
C1020		Wood, Solid Core, Painted, Interior Door	2010	30	1 Each			
C1020		Wood, Solid Core, Painted, Interior Door	1972	-8	18 Each	$25,103		
C1020		Wood, Solid Core, Painted, Interior Double Door - JE	1972	-8	2 Each	$4,895		
C2010		Concrete, Exterior Stairs	1972	2	30 SqFt		Site	
C2010		Metal, Painted, Exterior Railing	1972	-18	25 LnFt	$1,266	Site	
C2010		Metal, Painted, Exterior Railing	1972	-18	65 LnFt	$3,292	Roof	

Uniformat	Equip ID	Component	Install Year	Remaining Service Life	Quantity	Deferred Maintenance	Location	Note
C2010		Metal, Painted, Interior Railing	2004	34	24 LnFt			
C3010		Acoustical Interior Wall Tile, Fabric Faced	1972	-13	1,600 SqFt	$14,489		
C3010		Ceramic Tile, Interior Wall Finish, 16 Sq In	2010	65	940 SqFt			
C3010		Clay Brick, Interior Wall Finish	1958	13	183 SqFt			
C3010		Concrete Block, Painted, Interior Wall Finish	1958	49	2,695 SqFt			
C3010		Concrete Block, Painted, Interior Wall Finish	1972	49	2,305 SqFt			
C3010		Gypsum Board, Interior Wall Finish	1972	27	7,226 SqFt			
C3010		Gypsum Board, Interior Wall Finish	2004	59	834 SqFt			
C3010		Plaster, Interior Wall Finish	1958	13	4,500 SqFt			
C3020		Access Flooring w/ Laminate, Raised	1972	-8	1,420 SqFt	$36,637		
C3020		Access Flooring, (Computer Room Raised Floor) - JE	1972	-8	1,905 SqFt	$59,117		
C3020		Carpet on Access Flooring - JE	2019	9	1,905 SqFt			
C3020		Carpet, Nylon, High Traffic, 20 oz	2010	-2	915 SqFt	$5,586		
C3020		Carpet, Nylon, High Traffic, 20 oz	2019	7	2,051 SqFt			
C3020		Ceramic Tile Flooring	2010	40	335 SqFt			
C3020		Concrete Flooring	1972	49	343 SqFt			
C3020		Concrete Flooring	1958	49	237 SqFt			
C3020		Rubber Tile Flooring	2004	2	172 SqFt			Ramps
C3020		Vinyl Tile Flooring	1972	-30	72 SqFt	$186 Link		
C3020		Vinyl Tile Flooring	1972	-30	873 SqFt	$2,254		
C3020		Vinyl Tile Flooring	1972	-30	566 SqFt	$1,461		
C3030		Acoustical Tile, Dropped Ceiling - JE	2004	4	1,860 SqFt			
C3030		Acoustical Tile, Dropped Ceiling - JE	2010	10	229 SqFt			
C3030		Acoustical Tile, Dropped Ceiling - JE	1972	-28	72 SqFt	$181 Link		
C3030		Acoustical Tile, Dropped Ceiling - JE	1972	-28	168 SqFt	$422		
C3030		Acoustical Tile, Dropped Ceiling - JE	1972	-28	4,165 SqFt	$10,467		
C3030		Gypsum Board, Finished Ceiling	2010	65	106 SqFt			
C3030		Metal Ceiling	1958	49	1,699 SqFt			Exposed Structure
C3030		Metal Ceiling	1972	49	579 SqFt			Exposed Structure
D2010	EWC-1	Drinking Fountain, Refrigerated	1989	-21	1 Each	$1,290		
D2010		Lavatory, Vitreous China	2010	25	6 Each			
D2010		Service Sink, Iron, Enamel	1972	-13	1 Each	$1,300		
D2010		Sink, Stainless Steel	2004	24	2 Each			
D2010		Tankless Water Closet	2010	25	5 Each			
D2010		Urinal, Vitreous China	2010	25	2 Each			

Uniformat	Equip ID	Component	Install Year	Remaining Service Life	Quantity	Deferred Maintenance	Location	Note
D2020	P-3	Circulator Pump, Hot Water, 0.083 HP	2018	18	1 Each			
D2020		Gate Valve, 3.00 In	1972	-31	1 Each	$566		2-1/2"
D2020		Hose Bib	1972	-38	1 Each	$39		
D2020		Pipe & Fittings, 1" Steel - JE	1958	-1	0.05 KLnFt	$628		
D2020		Pipe & Fittings, 1" Steel - JE	1972	-1	0.185 KLnFt	$2,324		3/4"
D2020		Pipe & Fittings, 1" Steel - JE	1972	-1	0.077 KLnFt	$967		
D2020		Pipe & Fittings, 2" Steel - JE	1972	-1	0.112 KLnFt	$2,040		
D2020		Pipe Insulation, Fiberglass, Cold Water - JE	1972	-23	0.374 KLnFt	$1,389		
D2020		Pipe Insulation, Fiberglass, Cold Water - JE	1958	-37	0.05 KLnFt	$186		
D2020		Pressure Reducer Valve, 1.50 In	1972	-42	1 Each	$513		
D2020	WH-1	Water Heater, Gas/Oil, 30 Gph	2005	-5	1 Each	$2,572		40.94 gal/hr recover, 28 gallon
D2020	WH-2	Water Heater, Gas/Oil, 30 Gph	2017	7	1 Each			37.29 gal/hr, 30 gallon
D2030		Backflow Preventer, 0.75 In	1972	-38	1 Each	$790		
D2030		Floor Drain	1958	-22	3 Each	$764		
D2030		Floor Drain	2010	30	4 Each			
D2030		Pipe & Fittings, 3" Cast Iron - JE	1972	27	0.066 KLnFt			
D2030		Pipe & Fittings, 4" Cast Iron - JE	1958	13	0.038 KLnFt			
D2030		Pipe & Fittings, 4" Cast Iron - JE	1972	27	0.178 KLnFt			
D2030		Pipe & Fittings, 6" Cast Iron - JE	1972	27	0.04 KLnFt			5"
D2030		Pipe & Fittings, 6" Cast Iron - JE	1972	27	0.017 KLnFt			
D2040		Roof Drain, 6.00 In	2016	36	4 Each			
D2040	DG-1	Sump Pump, 0.500 HP	2004	4	1 Each			Sink Drain Pump, 1/3 HP
D2090	AC-1	Air Compressor, 0.750 HP	1988	-7	1 Each	$3,012		
D2090	AD-1	Compressed Air Dryer	1988	-17	1 Each	$5,533		
D3010		Pipe & Fittings, 2" Steel, Gas - JE	1972	27	0.097 KLnFt			
D3020		Ball Valve, 2.00 In	1997	-8	2 Each	$1,147		
D3020	B-1	Boiler, Gas, 300 Mbh	2016	26	1 Each			419.4 MBH output
D3020		Check Valve, 4.00 In	1997	-3	1 Each	$2,008		2"
D3020	CPF-1	Chemical Bypass Pot Feeder - JE	1997	-3	1 Each	$1,073		
D3020	P-1, P-2	Circulator Pump, 1 HP, Hot Water - JE	2014	9	2 Each			3/4 HP
D3020	ET-1	Expansion Tank, 30 Gal	1997	27	1 Each			
D3020		Pipe Insulation, Fiberglass, Heating Water/Steam - JE	1997	2	0.045 KLnFt			
D3020		Pipe Insulation, Fiberglass, Heating Water/Steam - JE	1972	-23	0.294 KLnFt	$1,676		
D3030	CRU-1, CRU-2	Air Conditioner, Computer Room, Air-Cooled (CRAC), 1	2004	6	2 Each			199 MBH
D3030	CRU-3, CRU-4	Air Conditioner, Computer Room, Air-Cooled (CRAC), 2	2004	6	2 Each			245 MBH

Uniformat	Equip ID	Component	Install Year	Remaining Service Life	Quantity	Deferred Maintenance	Location	Note
D3030		Calibrated Balancing Valve, 2.00 In	1997	-6	1 Each	$156		1-1/4"
D3030	CU-4	Condenser, Air-Cooled, 10.0 Ton	2017	14	1 Each		Roof	
D3030	ACC-1, ACC-2	Condenser, Air-Cooled, 15.0 Ton	2004	1	2 Each		Roof	199 MBH
D3030	ACC-3, ACC-4	Condenser, Air-Cooled, 20.0 Ton	2004	1	2 Each		Roof	245 MBH
D3030	CU-5	Condenser, Air-Cooled, 20.0 Ton	2017	14	1 Each		Grade	
D3030	CU-1, CU-2	Condenser, Air-Cooled, 3.0 Ton	2004	1	2 Each		Grade	
D3030		Pipe & Fittings, 1" Steel - JE	1972	27	0.131 KLnFt			
D3030		Pipe & Fittings, 3" Steel - JE	1997	52	0.045 KLnFt			2-1/2"
D3030		Pipe & Fittings, 3/4" Steel - JE	1972	27	0.163 KLnFt			
D3040	AHU-5	Air Handler, Multizone, 10,000 Cfm	1997	-4	1 Each	$29,663		Approximately 11,000 Cfm
D3040	AHU-1, AHU-2	Air Handler, Single Zone, 1,300 Cfm	2004	3	2 Each			1,200 Cfm
D3040	AHU-4	Air Handler, Single Zone, 5,000 Cfm	1972	-29	1 Each	$13,486		3,800 Cfm
D3040	EF-1	Exhaust Fan, Propeller, 375 Cfm	2004	3	1 Each			400 Cfm
D3040	SF-2	Exhaust Fan, Propeller, 800 Cfm	2016	15	1 Each			Supply Fan for Boiler Combustion Air
D3040	EF-3	Exhaust Fan, Roof Mounted, 400 Cfm	1958	-43	1 Each	$778		240 Cfm
D3040	EF-2	Exhaust Fan, Roof Mounted, 500 Cfm	1972	-29	1 Each	$1,006		490 Cfm
D3040	CLF-2, CLF-3	Residential Type Ceiling Fan	2004	3	2 Each			
D3050	RC-1 thru RC-8	Secondary Coil, 288 Sq In	1972	-25	8 Each	$4,090		
D3060		Direct Digital Controls, System Points	1997	-13	18 Each	$10,425		
D3060		Metasys Controllers - JE	1997	-8	2 Each	$2,286		
D4030	FAAP-2	Fire Annunciator Panel - JE	2012	7	1 Each		TRACON	
D4030		Fire Extinguisher	2012	4	5 Each			
D5010		Circuit Breaker, 15/20 Amp. - JE	1994	4	6 Each			
D5010		Circuit Breaker, 15/20 Amp. - JE	1995	5	68 Each			
D5010		Circuit Breaker, 15/20 Amp. - JE	1998	8	20 Each			
D5010		Circuit Breaker, 15/20 Amp. - JE	1972	-18	79 Each	$2,366		
D5010		Circuit Breaker, 15/20 Amp. - JE	2004	14	151 Each			
D5010		Circuit Breaker, 15/20 Amp. - JE	1988	-2	46 Each	$1,377		
D5010		Circuit Breaker, 15/20 Amp. - JE	1989	-1	10 Each	$299	Courtyard	
D5010		Circuit Breaker, 3 Ph., 600 V, 100 Amp	1995	5	3 Each			70-100 Amp
D5010		Circuit Breaker, 3 Ph., 600 V, 100 Amp	2004	14	17 Each			70-100 Amp
D5010		Circuit Breaker, 3 Ph., 600 V, 100 Amp	1958	-32	2 Each	$2,653		70-100 Amp
D5010		Circuit Breaker, 3 Ph., 600 V, 100 Amp	1972	-18	2 Each	$2,653		70-100 Amp
D5010		Circuit Breaker, 3 Ph., 600 V, 100 Amp	2004	34	1 Each			100 Amp Enclosed Circuit Breaker
D5010		Circuit Breaker, 3 Ph., 600 V, 100 Amp	1989	-1	6 Each	$7,960	Courtyard	

Uniformat	Equip ID	Component	Install Year	Remaining Service Life	Quantity	Deferred Maintenance	Location	Note
D5010		Circuit Breaker, 3 Ph., 600 V, 60 Amp	1995	5	2 Each			30-60 Amp
D5010		Circuit Breaker, 3 Ph., 600 V, 60 Amp	2004	14	13 Each			30-60 Amp
D5010		Circuit Breaker, 3 Ph., 600 V, 60 Amp	1958	-32	4 Each	$4,811		30-60 Amp
D5010		Circuit Breaker, 3 Ph., 600 V, 60 Amp	1972	-18	7 Each	$8,419		30-60 Amp
D5010		Circuit Breaker, 3 Ph., 600 V, 60 Amp	1988	-2	17 Each	$20,447		30-60 Amp
D5010		Circuit Breaker, 600 V, 400 Amp	1994	4	1 Each			125-400 Amp
D5010		Circuit Breaker, 600 V, 400 Amp	2004	14	10 Each			125-400 Amp
D5010		Circuit Breaker, 600 V, 400 Amp	1958	-32	2 Each	$8,548		125-400 Amp
D5010		Circuit Breaker, 600 V, 400 Amp	1972	-18	1 Each	$4,274		125-400 Amp
D5010		Circuit Breaker, 600 V, 400 Amp	1988	-2	1 Each	$4,274		125-400 Amp
D5010		Circuit Breaker, 600 V, 400 Amp	1989	-1	8 Each	$34,194	Courtyard	125-400 Amp
D5010		Circuit Breaker, Main, 208 Y, 120 V, 1,200 Amp	1989	-1	1 Each	$11,066	Courtyard	
D5010		Disconnect Switch, 200 Amp	1989	19	2 Each			
D5010		Disconnect Switch, 200 Amp	2004	34	1 Each			
D5010		Disconnect Switch, 30 Amp	2004	34	6 Each			
D5010		Disconnect Switch, 60 Amp	1997	27	1 Each			
D5010		Disconnect Switch, 60 Amp	2004	34	2 Each			
D5010		Motor Starter, 2.000 HP, 208 V	1997	-5	1 Each	$683		
D5010		Motor Starter, 2.000 HP, 208 V	1997	-5	1 Each	$683		
D5010	MDPN	Power Panel Board, 208 Y, 120 V, 1,200 Amp	1989	-1	1 Each	$11,826	Courtyard	
D5010	MCIE	Power Panel Board, 208 Y, 120 V, 100 Amp	1998	8	1 Each			
D5010	KLPN, P5	Power Panel Board, 208 Y, 120 V, 100 Amp	2004	14	2 Each			
D5010	CAB5	Power Panel Board, 208 Y, 120 V, 100 Amp	2004	14	1 Each			Load Center Type Panel, 125 Amp
D5010	P4	Power Panel Board, 208 Y, 120 V, 100 Amp	1988	-2	1 Each	$3,809		20 Amp
D5010	MCIN	Power Panel Board, 208 Y, 120 V, 200 Amp	1994	4	1 Each			
D5010	Hall PP	Power Panel Board, 208 Y, 120 V, 200 Amp	1972	-18	1 Each	$5,199		
D5010	Hall LP	Power Panel Board, 208 Y, 120 V, 200 Amp	1972	-18	1 Each	$5,199		
D5010	KPPN	Power Panel Board, 208 Y, 120 V, 200 Amp	2004	14	1 Each			
D5010	P1, P3	Power Panel Board, 208 Y, 120 V, 225 Amp	1995	5	2 Each			
D5010	MCIC	Power Panel Board, 208 Y, 120 V, 225 Amp	1998	8	1 Each			250 Amp
D5010	North LP	Power Panel Board, 208 Y, 120 V, 225 Amp	1972	-18	1 Each	$6,146		
D5010	CLPB1, CLPB2, ELPB-1	Power Panel Board, 208 Y, 120 V, 225 Amp	2004	14	3 Each			
D5010	P2	Power Panel Board, 208 Y, 120 V, 225 Amp	1988	-2	1 Each	$6,146		
D5010	Courtyard LP	Power Panel Board, 208 Y, 120 V, 225 Amp	1989	-1	1 Each	$6,146	Courtyard	
D5010	CCP, EPP	Power Panel Board, 208 Y, 120 V, 400 Amp	2004	14	2 Each			300 Amp

Uniformat	Equip ID	Component	Install Year	Remaining Service Life	Quantity	Deferred Maintenance	Location	Note
D5010	North PP	Power Panel Board, 208 Y, 120 V, 600 Amp	1958	-32	1 Each	$8,427		
D5010	EHPB-1	Power Panel Board, 480 Y, 277 V, 200 Amp	2004	14	1 Each			225 Amp
D5010	T1	Secondary Transformer, Dry, 150 kVA	1989	-1	1 Each	$11,859	Courtyard	
D5010		Transient Voltage Surge Suppression Panel	2004	14	1 Each			
D5010		Transient Voltage Surge Suppression Panel	1989	-1	1 Each	$603		
D5020		Compact Fluorescent Lighting Fixture, Digital Addressabl	2004	4	12 Each			
D5020		Fluorescent Lighting Fixture, T12, 40 W	1972	-28	22 Each	$3,432		8ft Fixtures
D5020		Fluorescent Lighting Fixture, T12, 40 W	1958	-42	8 Each	$1,248		2 Bulb Fixtures
D5020		Fluorescent Lighting Fixture, T8, 25 W	2004	4	23 Each			2 Bulb Fixtures
D5020		Fluorescent Lighting Fixture, T8, 25 W	2004	4	1 Each			1 Bulb Fixture
D5020		Fluorescent Lighting Fixture, T8, 32 W	2004	4	78 Each			3-4 Bulb Fixtures
D5020		Grounded Fault Circuit Interrupter, 15 Amp	2004	4	7 Each			
D5020		Grounded Fault Circuit Interrupter, 15 Amp	2010	10	3 Each			
D5020		Halogen Lighting Fixture, 100 W	1972	-28	1 Each	$219	Site	Flag Light
D5020		High Pressure Sodium Lighting Fixture, 250 W	1958	-42	1 Each	$1,462		
D5020		Incandescent Lighting Fixture, Basic, 100 W	1972	-28	11 Each	$1,508		
D5020		LED Lighting Fixture, Basic, 11 W	2016	16	2 Each			
D5020		Metal Halide Lighting Fixture, Wall Mount, 150 W	1958	-42	1 Each	$429	Link	
D5020		Receptacle, 120 V, 20 Amp	2004	4	15 Each			
D5020		Receptacle, 120 V, 20 Amp	1972	-28	174 Each	$10,220		
D5020		Wiring Device, Switch	1972	-33	92 Each	$2,473		
D5020		Wiring Device, Switch	2004	-1	6 Each	$161		
D5030		Camera, Exterior, Closed Circuit, Fixed Color	2004	-6	1 Each	$3,283		
D5030		Camera, Interior, Closed Circuit, Fixed Color	2004	-6	2 Each	$3,545		
D5030		Camera, Interior, Closed Circuit, Fixed Color	2004	-6	1 Each	$1,773	Link	
D5030		Card Reader	2004	-6	5 Each	$3,094		
D5030		Card Reader	2004	-6	1 Each	$619	Site	At Gate
D5030		Electronic Lock	2004	-6	5 Each	$1,066		
D5030		Fire Alarm Horn & Strobe	2012	12	28 Each			
D5030		Intercom Speaker	2004	4	1 Each		Site	At Gate
D5030		Intercom Speaker	2004	4	1 Each			
D5030		Intrusion Detection Motion Detector, Interior	2004	-6	1 Each	$572	Link	
D5030		Intrusion Detection Motion Detector, Interior	2004	-6	2 Each	$1,144		
D5030		Manual Pull Station	2012	7	2 Each			
D5030		Monitor, Medium, Closed Circuit	2004	-6	1 Each	$3,272		

Uniformat	Equip ID	Component	Install Year	Remaining Service Life	Quantity		Deferred Maintenance		Location	Note
D5030		Public Address Speaker	2004	-1	7	Each	$1,850			
D5030		Remote Door Release System - JE	2012	7	1	Each		Link		
D5030		Security Control Panel	2004	-1	4	Each	$24,466			
D5030		Smoke Detector	2012	7	36	Each				
D5030		Smoke Detector, Duct	2012	7	3	Each				
D5090		Lightning Protection - JE	2016	21	0.765	KLnFt				
E1010		Cooking Range, Commercial	2004	-6	1	Each	$2,322			
E1010	D-1, D-2	Disposal, Garbage, Electric	2004	-6	2	Each	$801			
E1010		Kitchen Cabinet, Wood - JE	2004	-6	12	Each	$14,510			
E1010		Kitchen Exhaust Hood, Commercial	2004	-1	1	Each	$6,005			
E1010		Kitchen Exhaust Hood, Domestic - JE	2004	-1	1	Each	$481			
E1010		Microwave Oven	2004	-6	1	Each	$238			
E1010		Range/Oven	2004	-6	1	Each	$4,594			Double Wall Oven
E1010		Range/Oven	1958	-52	1	Each	$4,594			
E1010		Refrigerator, Domestic	2004	-6	1	Each	$1,203			
E1010		Refrigerator, Domestic	2015	5	2	Each				
E1010		Refrigerator, Domestic	2018	8	1	Each				
E1020		Dishwasher, Electric	2004	-6	1	Each	$5,259			
G2010		Asphaltic Pavement, Parking Lot, >10,000 sq.ft - JE	1972	-38	23,500	SqFt	$97,694	Site		
G2030		Concrete Curb & Gutter - JE	1972	-23	907	LnFt	$11,148			
G2030		Concrete Sidewalk, 4" Thick - JE	1972	-23	2,356	SqFt	$11,934	Site		
G2030		Concrete Sidewalk, 4" Thick - JE	1988	-7	1,678	SqFt	$8,500	Site		
G2040		Chain Link Fence, 8 Ln Ft	2004	14	1,050	LnFt		Site		Assumed Date
G2040		Sliding Gate, Motor Operated	2004	4	1	Each		Site		New Motor in 2019
G4020		Outdoor Pole Light - JE	1972	-28	2	Each	$5,273	Site		
G4020		Outdoor Pole Light - JE	2019	19	1	Each		Site		LED
G9090		TUL - Base Building Duplicates $1,814,178 - $696,578 (A	1958	N/A	1	Each	$1,117,600			

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building Name: TUL - Base Building

Year Installed	Years Deferred	Deferred Maintenance Tasks	Quantity	UoM	Deferred Maintenance Cost	Equip ID
1958	N/A	TUL - Base Building Duplicates $1,814,178 - $696,578 (APP E)	1	Each	$1,117,600	
1972	38	Resurface Asphaltic Pavement, Parking Lot, >10,000 sq.ft - JE	23,500	SqFt	$97,694	
1972	8	Replace Access Flooring, (Computer Room Raised Floor) - JE	1,905	SqFt	$59,117	
1972	8	Replace Access Flooring w/ Laminate, Raised	1,420	SqFt	$36,637	
1989	1	Replace Circuit Breaker, 600 V, 400 Amp	8	Each	$34,194	
1997	4	Replace Air Handler, Multizone, 10,000 Cfm	1	Each	$29,663	AHU-5
1972	8	Replace Wood, Solid Core, Painted, Interior Door	18	Each	$25,103	
2004	1	Replace Security Control Panel	4	Each	$24,466	
1988	2	Replace Circuit Breaker, 3 Ph., 600 V, 60 Amp	17	Each	$20,447	
2004	6	Replace Kitchen Cabinet, Wood - JE	12	Each	$14,510	
1972	13	Replace Acoustical Interior Wall Tile, Fabric Faced	1,600	SqFt	$14,489	
1972	29	Replace Air Handler, Single Zone, 5,000 Cfm	1	Each	$13,486	AHU-4
1972	23	Replace Concrete Sidewalk, 4" Thick - JE	2,356	SqFt	$11,934	
1989	1	Replace Secondary Transformer, Dry, 150 kVA	1	Each	$11,859	T1
1989	1	Replace Power Panel Board, 208 Y, 120 V, 1,200 Amp	1	Each	$11,826	MDPN
1972	23	Replace Concrete Curb & Gutter - JE	907	LnFt	$11,148	
1989	1	Replace Circuit Breaker, Main, 208 Y, 120 V, 1,200 Amp	1	Each	$11,066	
1972	28	Replace Acoustical Tile, Dropped Ceiling - JE	4,165	SqFt	$10,467	
1997	13	Replace Direct Digital Controls, System Points	18	Each	$10,425	
1972	28	Replace Receptacle, 120 V, 20 Amp	174	Each	$10,220	
2015	1	Replace Glass Curtain Wall	200	SqFt	$9,319	
1958	32	Replace Circuit Breaker, 600 V, 400 Amp	2	Each	$8,548	
1988	7	Replace Concrete Sidewalk, 4" Thick - JE	1,678	SqFt	$8,500	
1958	32	Replace Power Panel Board, 208 Y, 120 V, 600 Amp	1	Each	$8,427	North PP
1972	18	Replace Circuit Breaker, 3 Ph., 600 V, 60 Amp	7	Each	$8,419	
1958	22	Replace Wood, Solid Core, Painted, Interior Door	6	Each	$8,368	
1989	1	Replace Circuit Breaker, 3 Ph., 600 V, 100 Amp	6	Each	$7,960	
1972	18	Replace Power Panel Board, 208 Y, 120 V, 225 Amp	1	Each	$6,146	North LP
1988	2	Replace Power Panel Board, 208 Y, 120 V, 225 Amp	1	Each	$6,146	P2
1989	1	Replace Power Panel Board, 208 Y, 120 V, 225 Amp	1	Each	$6,146	Courtyard LP
2004	1	Replace Kitchen Exhaust Hood, Commercial	1	Each	$6,005	
2010	2	Replace Carpet, Nylon, High Traffic, 20 oz	915	SqFt	$5,586	
1988	17	Replace Compressed Air Dryer	1	Each	$5,533	AD-1
1972	28	Replace Outdoor Pole Light - JE	2	Each	$5,273	
2004	6	Replace Dishwasher, Electric	1	Each	$5,259	
1972	18	Replace Power Panel Board, 208 Y, 120 V, 200 Amp	1	Each	$5,199	Hall PP
1972	18	Replace Power Panel Board, 208 Y, 120 V, 200 Amp	1	Each	$5,199	Hall LP
1972	8	Replace Wood, Solid Core, Painted, Interior Double Door - JE	2	Each	$4,895	
1958	32	Replace Circuit Breaker, 3 Ph., 600 V, 60 Amp	4	Each	$4,811	
2004	6	Replace Range/Oven	1	Each	$4,594	
1958	52	Replace Range/Oven	1	Each	$4,594	
1972	18	Replace Circuit Breaker, 600 V, 400 Amp	1	Each	$4,274	
1988	2	Replace Circuit Breaker, 600 V, 400 Amp	1	Each	$4,274	
1972	25	Replace Secondary Coil, 288 Sq In	8	Each	$4,090	RC-1 thru RC-8
1988	2	Replace Power Panel Board, 208 Y, 120 V, 100 Amp	1	Each	$3,809	P4
1958	1	Replace Clay Brick, Exterior, 1 Story	160	SqFt	$3,607	

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building Name: TUL - Base Building

Year Installed	Years Deferred	Deferred Maintenance Tasks	Quantity	UoM	Deferred Maintenance Cost	Equip ID
2004	6	Replace Camera, Interior, Closed Circuit, Fixed Color	2	Each	$3,545	
1972	28	Replace Fluorescent Lighting Fixture, T12, 40 W	22	Each	$3,432	
1972	18	Replace Metal, Painted, Exterior Railing	65	LnFt	$3,292	
2004	6	Replace Camera, Exterior, Closed Circuit, Fixed Color	1	Each	$3,283	
2004	6	Replace Monitor, Medium, Closed Circuit	1	Each	$3,272	
2004	6	Replace Card Reader	5	Each	$3,094	
1988	7	Replace Air Compressor, 0.750 HP	1	Each	$3,012	AC-1
1958	32	Replace Circuit Breaker, 3 Ph., 600 V, 100 Amp	2	Each	$2,653	
1972	18	Replace Circuit Breaker, 3 Ph., 600 V, 100 Amp	2	Each	$2,653	
2005	5	Replace Water Heater, Gas/Oil, 30 Gph	1	Each	$2,572	WH-1
1972	33	Replace Wiring Device, Switch	92	Each	$2,473	
1972	18	Replace Circuit Breaker, 15/20 Amp. - JE	79	Each	$2,366	
1972	1	Replace Pipe & Fittings, 1" Steel - JE	0.185	KLnFt	$2,324	
2004	6	Replace Cooking Range, Commercial	1	Each	$2,322	
1997	8	Replace Metasys Controllers - JE	2	Each	$2,286	
1972	30	Replace Vinyl Tile Flooring	873	SqFt	$2,254	
1972	1	Replace Pipe & Fittings, 2" Steel - JE	0.112	KLnFt	$2,040	
1997	3	Replace Check Valve, 4.00 In	1	Each	$2,008	
2004	1	Replace Public Address Speaker	7	Each	$1,850	
1987	3	Replace Metal Awning	190	SqFt	$1,845	
1972	1	Replace Steel, Painted, Exterior Door	2	Each	$1,793	
2004	6	Replace Camera, Interior, Closed Circuit, Fixed Color	1	Each	$1,773	
1972	23	Replace Pipe Insulation, Fiberglass, Heating Water/Steam - JE	0.294	KLnFt	$1,676	
1972	28	Replace Incandescent Lighting Fixture, Basic, 100 W	11	Each	$1,508	
1958	42	Replace High Pressure Sodium Lighting Fixture, 250 W	1	Each	$1,462	
1972	30	Replace Vinyl Tile Flooring	566	SqFt	$1,461	
1972	23	Replace Pipe Insulation, Fiberglass, Cold Water - JE	0.374	KLnFt	$1,389	
1988	2	Replace Circuit Breaker, 15/20 Amp. - JE	46	Each	$1,377	
1972	13	Replace Service Sink, Iron, Enamel	1	Each	$1,300	
1989	21	Replace Drinking Fountain, Refrigerated	1	Each	$1,290	EWC-1
1972	8	Replace Steel Roof Access Ladder	15	LnFt	$1,271	
1972	18	Replace Metal, Painted, Exterior Railing	25	LnFt	$1,266	
1958	42	Replace Fluorescent Lighting Fixture, T12, 40 W	8	Each	$1,248	
2004	6	Replace Refrigerator, Domestic	1	Each	$1,203	
1997	8	Replace Ball Valve, 2.00 In	2	Each	$1,147	
2004	6	Replace Intrusion Detection Motion Detector, Interior	2	Each	$1,144	
1997	3	Replace Chemical Bypass Pot Feeder - JE	1	Each	$1,073	CPF-1
2004	6	Replace Electronic Lock	5	Each	$1,066	
1972	29	Replace Exhaust Fan, Roof Mounted, 500 Cfm	1	Each	$1,006	EF-2
1972	1	Replace Pipe & Fittings, 1" Steel - JE	0.077	KLnFt	$967	
1972	1	Replace Steel, Painted, Exterior Door	1	Each	$896	
2004	6	Replace Disposal, Garbage, Electric	2	Each	$801	D-1, D-2
1972	38	Replace Backflow Preventer, 0.75 In	1	Each	$790	
1958	43	Replace Exhaust Fan, Roof Mounted, 400 Cfm	1	Each	$778	EF-3
1958	22	Replace Floor Drain	3	Each	$764	

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building Name: TUL - Base Building

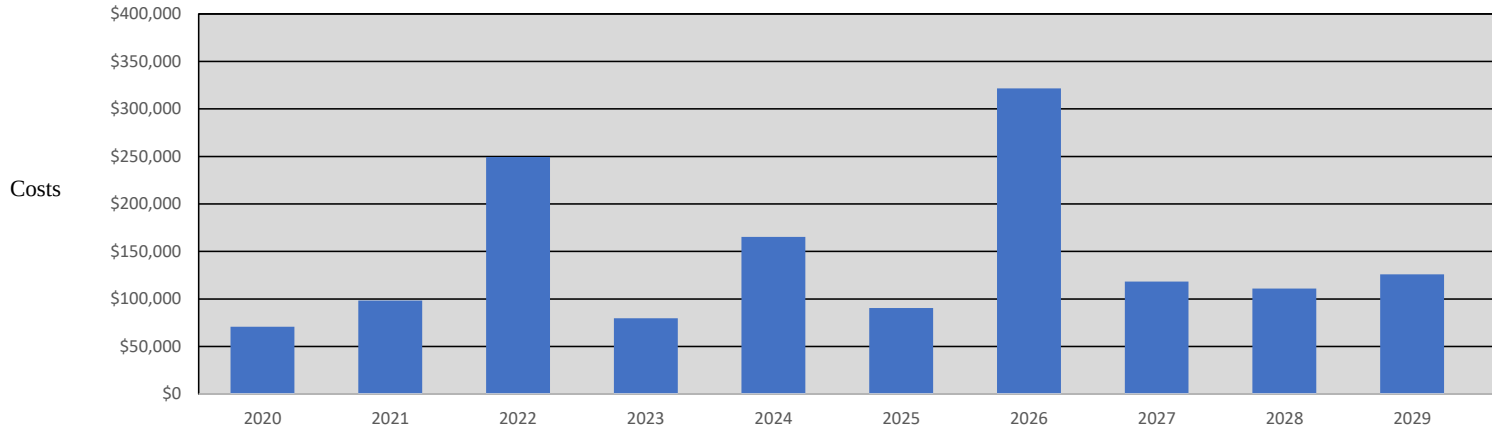
Year Installed	Years Deferred	Deferred Maintenance Tasks	Quantity	UoM	Deferred Maintenance Cost	Equip ID
1997	5	Replace Motor Starter, 2.000 HP, 208 V	1	Each	$683	
1997	5	Replace Motor Starter, 2.000 HP, 208 V	1	Each	$683	
1958	1	Replace Pipe & Fittings, 1" Steel - JE	0.05	KLnFt	$628	
2004	6	Replace Card Reader	1	Each	$619	
1989	1	Replace Transient Voltage Surge Suppression Panel	1	Each	$603	
1972	18	Replace Metal Awning	60	SqFt	$583	
2004	6	Replace Intrusion Detection Motion Detector, Interior	1	Each	$572	
1972	31	Replace Gate Valve, 3.00 In	1	Each	$566	
1972	42	Replace Pressure Reducer Valve, 1.50 In	1	Each	$513	
2004	1	Replace Kitchen Exhaust Hood, Domestic - JE	1	Each	$481	
1958	42	Replace Metal Halide Lighting Fixture, Wall Mount, 150 W	1	Each	$429	
1972	28	Replace Acoustical Tile, Dropped Ceiling - JE	168	SqFt	$422	
1989	1	Replace Circuit Breaker, 15/20 Amp. - JE	10	Each	$299	
2004	6	Replace Microwave Oven	1	Each	$238	
1972	28	Replace Halogen Lighting Fixture, 100 W	1	Each	$219	
1972	30	Replace Vinyl Tile Flooring	72	SqFt	$186	
1958	37	Replace Pipe Insulation, Fiberglass, Cold Water - JE	0.05	KLnFt	$186	
1972	28	Replace Acoustical Tile, Dropped Ceiling - JE	72	SqFt	$181	
2004	1	Replace Wiring Device, Switch	6	Each	$161	
1997	6	Replace Calibrated Balancing Valve, 2.00 In	1	Each	$156	
1972	38	Replace Valve Hose Bib	1	Each	$39	
				Total:	**$1,822,804**	

All costs expressed in ($) 2019

Building: TUL - Base Building **GSFT:** 10,060

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
B10 Super Structure										
B20 Exterior Enclosure	$203		$26,133	$41		$203		$246	$5,947	
B30 Roofing	$1,491	$2,212	$1,563	$1,491	$1,491	$1,491	$15,277	$1,978	$2,029	$1,491
C10 Interior Construction	$745	$60	$5,198	$352	$878	$104	$160	$970	$2,336	$4,288
C20 Stairs	$15		$787		$15				$15	
C30 Interior Finishes	$1,198	$250	$11,912	$250	$5,344	$365	$9,840	$12,522	$4,863	$21,356
D10 Conveying										
D20 Plumbing	$7,703	$4,666	$7,870	$5,602	$6,396	$6,659	$5,582	$6,938	$7,658	$5,996
D30 HVAC	$24,725	$56,130	$28,935	$36,979	$25,233	$24,528	$256,067	$40,844	$24,672	$48,346
D40 Fire Protection	$664	$664	$664	$664	$1,805	$664	$664	$1,508	$664	$664
D50 Electrical	$28,751	$29,177	$39,170	$28,917	$87,611	$48,790	$28,789	$35,952	$52,130	$37,827
E10 Equipment	$3,316	$3,316	$3,316	$3,316	$29,893	$5,721	$3,316	$3,316	$8,683	$3,316
G20 Site Improvements	$1,975	$1,975	$122,751	$1,975	$6,728	$1,975	$1,975	$14,117	$1,975	$1,975
G40 Site Electrical Utilities			$1,125							$563
Total $	**$70,786**	**$98,450**	**$249,424**	**$79,587**	**$165,394**	**$90,500**	**$321,670**	**$118,391**	**$110,972**	**$125,822**

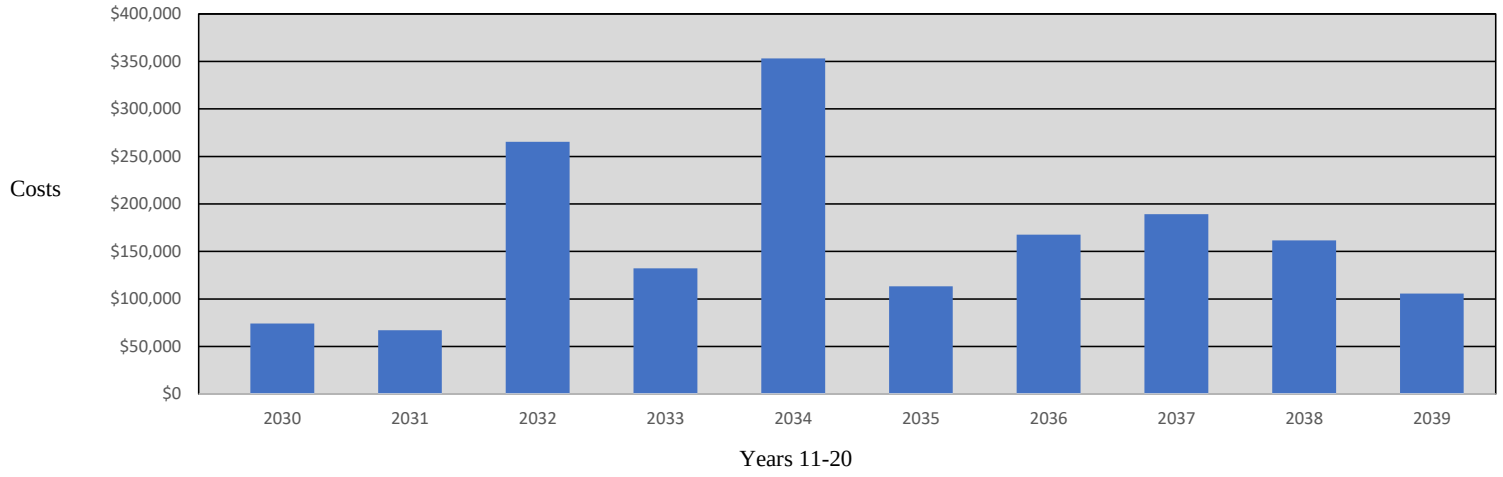


All costs expressed in ($) 2019

Building: TUL - Base Building **GSFT:** 10,060

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Forcast Year:	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	Total $
B10 Super Structure			$399								**$399**
B20 Exterior Enclosure	$203		$16,129	$4,994		$203		$246	$5,735		**$60,283**
B30 Roofing	$1,491	$2,212	$2,074	$1,491	$1,491	$1,491	$99,815	$1,718	$2,645	$1,491	**$146,433**
C10 Interior Construction	$1,934		$5,556	$1,284	$500	$44	$518	$1,050	$8,779	$727	**$35,483**
C20 Stairs			$4,630		$21		$15	$48			**$5,546**
C30 Interior Finishes	$1,859	$277	$18,941	$43,027	$6,200	$12,593	$312	$603	$2,438	$21,356	**$175,506**
D10 Conveying											
D20 Plumbing	$6,243	$5,293	$8,100	$11,746	$5,432	$6,659	$5,856	$6,938	$9,897	$5,996	**$137,230**
D30 HVAC	$27,094	$24,684	$26,367	$33,730	$38,228	$52,392	$24,672	$130,142	$56,263	$26,367	**$1,006,398**
D40 Fire Protection	$664	$664	$664	$664	$664	$664	$1,805	$664	$664	$664	**$16,406**
D50 Electrical	$29,350	$28,773	$73,504	$30,095	$209,377	$31,621	$29,463	$30,301	$56,150	$40,694	**$976,442**
E10 Equipment	$3,316	$3,316	$3,316	$3,316	$35,843	$5,721	$3,316	$3,316	$8,683	$3,316	**$140,968**
G20 Site Improvements	$1,975	$1,975	$99,669	$1,975	$55,389	$1,975	$1,975	$14,117	$10,475	$1,975	**$348,921**
G40 Site Electrical Utilities			$6,034							$3,017	**$10,739**
Total $	**$74,129**	**$67,194**	**$265,383**	**$132,322**	**$353,145**	**$113,363**	**$167,747**	**$189,143**	**$161,729**	**$105,603**	**$3,060,754**



All costs expressed in ($) 2019

M&R Cost by Task per Year

JACOBS

Facility: TUL - Tulsa, OK **City:** Tulsa, OK
Building: TUL - Base Building

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
B10 Super Structure															
Repair Steel Roof Access Ladder													399		
B20 Exterior Enclosure															
Clean & Reseal Clay Brick Clay Brick, Exterior, 1 Story			4,404						1,836				4,404		
Finish Replaced Steel, Painted, Exterior Door														20	
Maintain Door Locks Steel, Painted, Exterior Door			78	13				78	13				78		
Minor Repair (2% of Walls) Glass Curtain Wall	203					203					203				
Refinish Steel, Painted, Exterior Door			120						20				120		
Repair (2% of Walls) Clay Brick, Exterior, 1 Story			1,697											707	
Repair Aluminum Fixed Window, 1 Story, 12 Sq Ft															
Repair Steel, Painted, Exterior Door													954		
Replace Aluminum Fixed Window, 1 Story, 12 Sq Ft			1,177												
Replace Door Locks Steel, Painted, Exterior Door			1,151						192				1,151		
Replace Glass Curtain Wall															
Replace Steel, Painted, Exterior Door														896	
Repoint (50% of Surface) Clay Brick, Exterior, 1 Story			8,084											3,371	
B30 Roofing															
Maintain Single-Ply PVC Membrane Roof - JE	589	589	589	589	589	589	589	589	589	589	589	589	589	589	589
Non-Destructive Moisture Inspection Single-Ply PVC Membrane Roof - JE		721					721					721			
Refinish Metal Awning			72					227	538						
Repair Metal Awning								260							
Repair Single-Ply PVC Membrane Roof - JE							13,065								
Replace Flashing - JE															
Replace Metal Awning													583		
Replace Single-Ply PVC Membrane Roof - JE															
C10 Interior Construction															
Finish Replaced Steel, Painted, Interior Door														20	
Finish Replaced Wood, Solid Core, Painted, Interior Door										60					
Maintain Door Locks Steel, Painted, Interior Door			26	26				26	26				26	13	

All costs expressed in ($) 2019

M&R Cost by Task per Year

JACOBS

Facility: TUL - Tulsa, OK **City:** Tulsa, OK
Building: TUL - Base Building

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
B10 Super Structure															
Repair Steel Roof Access Ladder													399		
B20 Exterior Enclosure															
Clean & Reseal Clay Brick Clay Brick, Exterior, 1 Story				1,836				4,404						1,836	
Finish Replaced Steel, Painted, Exterior Door													120		
Maintain Door Locks Steel, Painted, Exterior Door			78	13				78	13				39	13	
Minor Repair (2% of Walls) Glass Curtain Wall	203					203					203				
Refinish Steel, Painted, Exterior Door								120	20						
Repair (2% of Walls) Clay Brick, Exterior, 1 Story													1,697		
Repair Aluminum Fixed Window, 1 Story, 12 Sq Ft								48							
Repair Steel, Painted, Exterior Door													477	159	
Replace Aluminum Fixed Window, 1 Story, 12 Sq Ft															
Replace Door Locks Steel, Painted, Exterior Door								1,151	192						
Replace Glass Curtain Wall															9,319
Replace Steel, Painted, Exterior Door													2,689		
Repoint (50% of Surface) Clay Brick, Exterior, 1 Story													8,084		
B30 Roofing															
Maintain Single-Ply PVC Membrane Roof - JE	589		589	589	589	589	589	589	589	589	589	589	589	589	589
Non-Destructive Moisture Inspection Single-Ply PVC Membrane Roof - JE							721					721			
Refinish Metal Awning			227	538				72							
Repair Metal Awning				616											
Repair Single-Ply PVC Membrane Roof - JE												13,065			
Replace Flashing - JE		1,311													
Replace Metal Awning													1,845	4,370	
Replace Single-Ply PVC Membrane Roof - JE		98,504													
C10 Interior Construction															
Finish Replaced Steel, Painted, Interior Door													40		
Finish Replaced Wood, Solid Core, Painted, Interior Door				120						20					
Maintain Door Locks Steel, Painted, Interior Door			26	26				26	26					26	

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - Base Building

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Maintain Door Locks Wood, Solid Core, Painted, Interior Door	13		232	77	52	13		232	77	13	13		232	77	52
Maintain Wood, Solid Core, Painted, Interior Double Door - JE			26					26					26		
Refinish Steel, Painted, Interior Door	60		20		60		20		60		20		60		
Refinish Wood, Solid Core, Painted, Interior Door	379	60	140		379	60	140		379		140		379	60	140
Refinish Wood, Solid Core, Painted, Interior Double Door - JE	79				79				79				79		
Remove and Reinstall Toilet Partitions - JE											1,547				
Replace Door Locks Steel, Painted, Interior Door			367						366				367		
Replace Door Locks Wood, Solid Core, Painted, Interior Door	183		3,299		183				1,100		183		3,299		183
Replace Locks Wood, Solid Core, Painted, Interior Double Door - JE			402										402		
Replace Steel, Painted, Interior Door														896	
Replace Wood, Solid Core, Painted, Interior Door										4,184					
C20 Stairs															
Finish Repaired Metal, Painted, Exterior Railing															
Finish Repaired Metal, Painted, Interior Railing															0
Finish Replaced Metal, Painted, Exterior Railing													57		
Refinish Metal, Painted, Exterior Railing			57												
Refinish Metal, Painted, Interior Railing	15				15				15				15		
Repair Concrete, Exterior Stairs															
Repair Metal, Painted, Exterior Railing															
Repair Metal, Painted, Interior Railing															21
Replace Concrete, Exterior Stairs			730												
Replace Metal, Painted, Exterior Railing													4,558		
C30 Interior Finishes															
Clean & Seal Clay Brick, Interior Wall Finish			184				184				184				
Finish Repaired Concrete Block, Painted, Interior Wall Finish			30											35	
Finish Repaired Gypsum Board, Finished Ceiling															
Finish Repaired Gypsum Board, Interior Wall Finish					10								90		
Finish Replaced Concrete Block, Painted, Interior Wall Finish														1,740	
Finish Replaced Gypsum Board, Interior Wall Finish															

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - Base Building

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Maintain Door Locks Wood, Solid Core, Painted, Interior Door	13		232		52	13		232	77	39	13		232	77	52
Maintain Wood, Solid Core, Painted, Interior Double Door - JE			26					26					26		
Refinish Steel, Painted, Interior Door		60	20			60	20			60	20			20	20
Refinish Wood, Solid Core, Painted, Interior Door		379	60	20		379	60	140		359	60	140		379	60
Refinish Wood, Solid Core, Painted, Interior Double Door - JE		79				79				79				79	
Remove and Reinstall Toilet Partitions - JE															
Replace Door Locks Steel, Painted, Interior Door				183				367	183					183	
Replace Door Locks Wood, Solid Core, Painted, Interior Door					550	183		3,299						1,100	550
Replace Locks Wood, Solid Core, Painted, Interior Double Door - JE								402							
Replace Steel, Painted, Interior Door													1,793		
Replace Wood, Solid Core, Painted, Interior Door				8,368						1,395					
C20 Stairs															
Finish Repaired Metal, Painted, Exterior Railing													1		
Finish Repaired Metal, Painted, Interior Railing															0
Finish Replaced Metal, Painted, Exterior Railing															
Refinish Metal, Painted, Exterior Railing								57							
Refinish Metal, Painted, Interior Railing		15				15				15				15	
Repair Concrete, Exterior Stairs			48												
Repair Metal, Painted, Exterior Railing													80		
Repair Metal, Painted, Interior Railing															21
Replace Concrete, Exterior Stairs															
Replace Metal, Painted, Exterior Railing															
C30 Interior Finishes															
Clean & Seal Clay Brick, Interior Wall Finish			184				184				184				184
Finish Repaired Concrete Block, Painted, Interior Wall Finish													30		
Finish Repaired Gypsum Board, Finished Ceiling	2														
Finish Repaired Gypsum Board, Interior Wall Finish										10					
Finish Replaced Concrete Block, Painted, Interior Wall Finish													1,488		
Finish Replaced Gypsum Board, Interior Wall Finish													4,514		

All costs expressed in ($) 2019

M&R Cost by Task per Year

JACOBS

Facility: TUL - Tulsa, OK **City:** Tulsa, OK
Building: TUL - Base Building

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Finish Replaced Plaster, Interior Wall Finish														2,811	
Minor Repair Access Flooring, (Computer Room Raised Floor) - JE													662		
Minor Repair Acoustical Interior Wall Tile, Fabric Faced	641														
Refinish Concrete Block, Painted, Interior Wall Finish			1,488						1,740				1,488		
Refinish Gypsum Board, Finished Ceiling	87										87				
Refinish Gypsum Board, Interior Wall Finish			4,514		521								4,514		521
Refinish Plaster, Interior Wall Finish									2,811						
Repair (2% of Carpet) Carpet, Nylon, High Traffic, 20 oz	112	250	112	250	112	250			112	250	112	250	112	250	
Repair (2% of Ceiling) Gypsum Board, Finished Ceiling															
Repair (2% of Ceiling) Metal Ceiling	200		586						200		586				
Repair (2% of Floors) Access Flooring w/ Laminate, Raised													733		
Repair (2% of Floors) Ceramic Tile Flooring						115									
Repair (2% of Floors) Concrete Flooring													37	25	
Repair (2% of Floors) Rubber Tile Flooring												27			
Repair (2% of Floors) Vinyl Tile Flooring															
Repair (2% of Walls) Ceramic Tile, Interior Wall Finish, 16 Sq In	146										146				
Repair (2% of Walls) Concrete Block, Painted, Interior Wall Finish			291											341	
Repair (2% of Walls) Gypsum Board, Interior Wall Finish					27								235		
Repair Acoustical Tile, Dropped Ceiling - JE	12		221												93
Replace Acoustical Interior Wall Tile, Fabric Faced															
Replace Acoustical Tile, Dropped Ceiling - JE					4,674						575		11,070		
Replace Carpet on Access Flooring - JE										21,106					
Replace Carpet, Nylon, High Traffic, 20 oz							5,586	12,522							5,586
Replace Clay Brick, Interior Wall Finish														2,585	
Replace Gypsum Board, Interior Wall Finish															
Replace Plaster, Interior Wall Finish														31,781	
Replace Rubber Tile Flooring			1,359												
Replace Vinyl Tile Flooring							3,901								
Repoint (50% of Surface) Concrete Block, Painted, Interior Wall Finish			2,958											3,459	

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - Base Building

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Finish Replaced Plaster, Interior Wall Finish															
Minor Repair Access Flooring, (Computer Room Raised Floor) - JE													662		
Minor Repair Acoustical Interior Wall Tile, Fabric Faced															
Refinish Concrete Block, Painted, Interior Wall Finish				1,740				1,488						1,740	
Refinish Gypsum Board, Finished Ceiling						87									
Refinish Gypsum Board, Interior Wall Finish								4,514		521					
Refinish Plaster, Interior Wall Finish									2,811						
Repair (2% of Carpet) Carpet, Nylon, High Traffic, 20 oz		112	250	112	250	112	250			112	250	112	250	112	250
Repair (2% of Ceiling) Gypsum Board, Finished Ceiling	7														
Repair (2% of Ceiling) Metal Ceiling		200		586						200		586			
Repair (2% of Floors) Access Flooring w/ Laminate, Raised													733		
Repair (2% of Floors) Ceramic Tile Flooring						115									
Repair (2% of Floors) Concrete Flooring													37	25	
Repair (2% of Floors) Rubber Tile Flooring															27
Repair (2% of Floors) Vinyl Tile Flooring	62														
Repair (2% of Walls) Ceramic Tile, Interior Wall Finish, 16 Sq In						146									
Repair (2% of Walls) Concrete Block, Painted, Interior Wall Finish													291		
Repair (2% of Walls) Gypsum Board, Interior Wall Finish										27					
Repair Acoustical Tile, Dropped Ceiling - JE						12		221							
Replace Acoustical Interior Wall Tile, Fabric Faced								14,489							
Replace Acoustical Tile, Dropped Ceiling - JE										4,674					
Replace Carpet on Access Flooring - JE					21,106										21,106
Replace Carpet, Nylon, High Traffic, 20 oz	12,522							5,586	12,522						
Replace Clay Brick, Interior Wall Finish															
Replace Gypsum Board, Interior Wall Finish													11,745		
Replace Plaster, Interior Wall Finish															
Replace Rubber Tile Flooring						1,359									
Replace Vinyl Tile Flooring										3,901					
Repoint (50% of Surface) Concrete Block, Painted, Interior Wall Finish													2,958		

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - Base Building

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
D20 Plumbing															
Check & Adjust Air Compressor, 0.750 HP	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156
Check & Adjust Compressed Air Dryer	124	124	124	124	124	124	124	124	124	124	124	124	124		124
Inspect & Lubricate Circulator Pump, Hot Water, 0.083 HP	102	102	102	102	102	102	102	102	102	102	102	102	102	102	102
Install New Gasket & Bolts Pipe & Fittings, 1" Steel - JE			21											4	
Install New Gasket & Bolts Pipe & Fittings, 2" Steel - JE			9												
Install New Gasket & Bolts Pipe & Fittings, 3" Cast Iron - JE			6												
Install New Gasket & Bolts Pipe & Fittings, 4" Cast Iron - JE			24												
Install New Gasket & Bolts Pipe & Fittings, 6" Cast Iron - JE			8												
Maintain Floor Drain	273	273	273	273	273	273	273	273	273	273	273	273	273	273	273
Maintain, 12 Month Backflow Preventer, 0.75 In	15	15		15	15	15	15	15	15	15	15	15		15	15
Maintain, 12 Month Roof Drain, 6.00 In	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
Maintain, 12 Month Sump Pump, 0.500 HP	29	29	29	29		29	29	29	29	29	29	29	29	29	29
Maintain, 3 Month Sump Pump, 0.500 HP	104	104	104	104		104	104	104	104	104	104	104	104	104	104
Maintain, 6 Month Roof Drain, 6.00 In	186	186	186	186	186	186	186	186	186	186	186	186	186	186	186
Maintain, 6 Month Sump Pump, 0.500 HP	58	58	58	58		58	58	58	58	58	58	58	58	58	58
Maintain, 6 Month Water Heater, Gas/Oil, 30 Gph	272	272	272	272	272	136	272	136	272	272	272	272	272	272	272
Overhaul Circulator Pump, Hot Water, 0.083 HP				48					48					48	
Overhaul Sump Pump, 0.500 HP										48					48
Overhaul Water Heater, Gas/Oil, 30 Gph	143		143								143		143		
Recharge Compressed Air Dryer				50					50						
Repack Gland Gate Valve, 3.00 In													46		
Repair Air Compressor, 0.750 HP	667				667				667				667		
Repair Strainer Service Sink, Iron, Enamel	40								40						
Repair Strainer Sink, Stainless Steel	80								80						
Replace 10' Section Pipe & Fittings, 1" Steel - JE	33										6		33		
Replace 10' Section Pipe & Fittings, 2" Steel - JE	20												20		
Replace 10' Section Pipe & Fittings, 3" Cast Iron - JE	16												16		
Replace 10' Section Pipe & Fittings, 4" Cast Iron - JE	76										16		76		

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - Base Building

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
D20 Plumbing															
Check & Adjust Air Compressor, 0.750 HP	156	156	156		156	156	156	156	156	156	156	156	156	156	156
Check & Adjust Compressed Air Dryer	124	124	124	124	124	124	124	124	124	124	124	124	124		124
Inspect & Lubricate Circulator Pump, Hot Water, 0.083 HP	102	102	102		102	102	102	102	102	102	102	102	102	102	102
Install New Gasket & Bolts Pipe & Fittings, 1" Steel - JE													21		
Install New Gasket & Bolts Pipe & Fittings, 2" Steel - JE													9		
Install New Gasket & Bolts Pipe & Fittings, 3" Cast Iron - JE															
Install New Gasket & Bolts Pipe & Fittings, 4" Cast Iron - JE															
Install New Gasket & Bolts Pipe & Fittings, 6" Cast Iron - JE															
Maintain Floor Drain	273	273	273	156	273	273	273	273	273	273	273	273	273	273	273
Maintain, 12 Month Backflow Preventer, 0.75 In	15	15	15	15	15	15	15		15	15	15	15	15	15	15
Maintain, 12 Month Roof Drain, 6.00 In	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
Maintain, 12 Month Sump Pump, 0.500 HP	29	29	29	29	29	29	29	29	29		29	29	29	29	29
Maintain, 3 Month Sump Pump, 0.500 HP	104	104	104	104	104	104	104	104	104		104	104	104	104	104
Maintain, 6 Month Roof Drain, 6.00 In	186	186	186	186	186	186	186	186	186	186	186	186	186	186	186
Maintain, 6 Month Sump Pump, 0.500 HP	58	58	58	58	58	58	58	58	58		58	58	58	58	58
Maintain, 6 Month Water Heater, Gas/Oil, 30 Gph	136	272	136	272	272	272	272	272	272	272	136	272	136	272	272
Overhaul Circulator Pump, Hot Water, 0.083 HP									48					48	
Overhaul Sump Pump, 0.500 HP					48										48
Overhaul Water Heater, Gas/Oil, 30 Gph						143		143							
Recharge Compressed Air Dryer				50					50						
Repack Gland Gate Valve, 3.00 In															46
Repair Air Compressor, 0.750 HP		667						667				667			
Repair Strainer Service Sink, Iron, Enamel		40													
Repair Strainer Sink, Stainless Steel		80													
Replace 10' Section Pipe & Fittings, 1" Steel - JE								6		33					
Replace 10' Section Pipe & Fittings, 2" Steel - JE										20					
Replace 10' Section Pipe & Fittings, 3" Cast Iron - JE										16					
Replace 10' Section Pipe & Fittings, 4" Cast Iron - JE										76	16				

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - Base Building

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Replace 10' Section Pipe & Fittings, 6" Cast Iron - JE	37												37		
Replace Air Compressor, 0.750 HP															
Replace Backflow Preventer, 0.75 In			790										790		
Replace Circulator Pump, Hot Water, 0.083 HP															
Replace Compressed Air Dryer														5,533	
Replace Compressor Compressed Air Dryer									1,432						
Replace Coolant & Adjust Drinking Fountain, Refrigerated	38	38	38	38	38	38	38	38	38		38	38	38	38	38
Replace Drinking Fountain, Refrigerated										1,290					
Replace Faucet Washer & Clean Trap Lavatory, Vitreous China	79		79		79		79		79		79		79		79
Replace Faucet Washer & Clean Trap Service Sink, Iron, Enamel	13		13		13		13		13		13		13		13
Replace Faucet Washer & Clean Trap Sink, Stainless Steel	26		26		26		26		26		26		26		26
Replace Floor Drain															
Replace Flush Valve Tankless Water Closet	64										64				
Replace Flush Valve Urinal, Vitreous China					454							454			
Replace Gate Valve, 3.00 In				566											
Replace Lavatory, Vitreous China															
Replace Pipe & Fittings, 3" Cast Iron - JE															
Replace Pipe & Fittings, 4" Cast Iron - JE														1,615	
Replace Pipe & Fittings, 6" Cast Iron - JE															
Replace Pipe Insulation, Fiberglass, Cold Water - JE			1,389											186	
Replace Pressure Reducer Valve, 1.50 In	513						513						513		
Replace Pump & Motor Assembly Sump Pump, 0.500 HP					358										
Replace Service Sink, Iron, Enamel															
Replace Sink, Stainless Steel															
Replace Tankless Water Closet															
Replace Urinal, Vitreous China															
Replace Valve Hose Bib			39										39		
Replace Valve Set Lavatory, Vitreous China	606										606				
Replace Valve Set Service Sink, Iron, Enamel			101										101		

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - Base Building

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Replace 10' Section Pipe & Fittings, 6" Cast Iron - JE										37					
Replace Air Compressor, 0.750 HP				3,012											
Replace Backflow Preventer, 0.75 In								790							
Replace Circulator Pump, Hot Water, 0.083 HP				969											
Replace Compressed Air Dryer														5,533	
Replace Compressor Compressed Air Dryer									1,432						
Replace Coolant & Adjust Drinking Fountain, Refrigerated	38	38	38	38		38	38	38	38	38	38	38	38	38	
Replace Drinking Fountain, Refrigerated					1,290										1,290
Replace Faucet Washer & Clean Trap Lavatory, Vitreous China		79		79		79		79		79			79		79
Replace Faucet Washer & Clean Trap Service Sink, Iron, Enamel		13		13		13				13		13		13	
Replace Faucet Washer & Clean Trap Sink, Stainless Steel		26		26		26		26				26		26	
Replace Floor Drain				764											
Replace Flush Valve Tankless Water Closet						64									
Replace Flush Valve Urinal, Vitreous China				454											
Replace Gate Valve, 3.00 In						566									
Replace Lavatory, Vitreous China											2,212				
Replace Pipe & Fittings, 3" Cast Iron - JE													1,588		
Replace Pipe & Fittings, 4" Cast Iron - JE													7,566		
Replace Pipe & Fittings, 6" Cast Iron - JE													3,768		
Replace Pipe Insulation, Fiberglass, Cold Water - JE													1,389		
Replace Pressure Reducer Valve, 1.50 In				513						513					
Replace Pump & Motor Assembly Sump Pump, 0.500 HP										358					
Replace Service Sink, Iron, Enamel								1,300							
Replace Sink, Stainless Steel										1,220					
Replace Tankless Water Closet											2,777				
Replace Urinal, Vitreous China											1,271				
Replace Valve Hose Bib								39							
Replace Valve Set Lavatory, Vitreous China						606									
Replace Valve Set Service Sink, Iron, Enamel															

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - Base Building

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Replace Valve Set Sink, Stainless Steel					202										202
Replace Washer & Spud Connection Lavatory, Vitreous China					173							173			
Replace Water Heater, Gas/Oil, 30 Gph						2,572		2,572							
Re-tape Pipe Insulation, Fiberglass, Cold Water - JE				11				82	11				82		
D30 HVAC															
Clean Fire Box Boiler, Gas, 300 Mbh	68		68		68		68		68		68		68		68
Inspect & Lubricate Circulator Pump, 1 HP, Hot Water - JE	43	43	43	43	43	43	43	43	43		43	43	43	43	43
Inspect & Maintain Metasys Controllers - JE	37	37	37	37	37	37	37		37	37	37	37	37	37	37
Inspect & Test Boiler, Gas, 300 Mbh	556	556	556	556	556	556	556	556	556	556	556	556	556	556	556
Install New Gasket & Bolts Pipe & Fittings, 1" Steel - JE			11												
Install New Gasket & Bolts Pipe & Fittings, 2" Steel, Gas - JE			8												
Install New Gasket & Bolts Pipe & Fittings, 3" Steel - JE			4												
Install New Gasket & Bolts Pipe & Fittings, 3/4" Steel - JE			13												
Maintain Direct Digital Controls, System Points	367	367	367	367	367	367	367		367	367	367	367	367	367	367
Maintain Expansion Tank, 30 Gal	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
Maintain Residential Type Ceiling Fan	31	31	31		31	31	31	31	31	31	31	31	31	31	31
Maintain, 12 Month Air Handler, Multizone, 10,000 Cfm	897	897	897	897	897	897	897	897	897	897	897	897	897	897	897
Maintain, 12 Month Air Handler, Single Zone, 1,300 Cfm	634	634	634		634	634	634	634	634	634	634	634	634	634	634
Maintain, 12 Month Air Handler, Single Zone, 5,000 Cfm	317	317	317	317	317	317	317	317	317		317	317	317	317	317
Maintain, 12 Month Check Valve, 4.00 In	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21
Maintain, 12 Month Condenser, Air-Cooled, 10.0 Ton	52	52	52	52	52	52	52	52	52	52	52	52	52	52	
Maintain, 12 Month Condenser, Air-Cooled, 15.0 Ton	105		105	105	105	105	105	105	105	105	105	105	105	105	105
Maintain, 12 Month Condenser, Air-Cooled, 20.0 Ton	157	52	157	157	157	157	157	157	157	157	157	157	157	157	105
Maintain, 12 Month Condenser, Air-Cooled, 3.0 Ton	105		105	105	105	105	105	105	105	105	105	105	105	105	105
Maintain, 3 Month Air Handler, Multizone, 10,000 Cfm	204	204	204	204	204	204	204	204	204	204	204	204	204	204	204
Maintain, 3 Month Air Handler, Single Zone, 1,300 Cfm	536	536	536		536	536	536	536	536	536	536	536	536	536	536
Maintain, 3 Month Air Handler, Single Zone, 5,000 Cfm	268	268	268	268	268	268	268	268	268		268	268	268	268	268
Maintain, 3 Month Condenser, Air-Cooled, 10.0 Ton	312	312	312	312	312	312	312	312	312	312	312	312	312	312	
Maintain, 3 Month Condenser, Air-Cooled, 15.0 Ton	624		624	624	624	624	624	624	624	624	624	624	624	624	624

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - Base Building

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Replace Valve Set Sink, Stainless Steel															
Replace Washer & Spud Connection Lavatory, Vitreous China				173											
Replace Water Heater, Gas/Oil, 30 Gph	2,572		2,572								2,572		2,572		
Re-tape Pipe Insulation, Fiberglass, Cold Water - JE			82	11				82	11					11	
D30 HVAC															
Clean Fire Box Boiler, Gas, 300 Mbh		68		68		68		68		68				68	
Inspect & Lubricate Circulator Pump, 1 HP, Hot Water - JE	43	43	43	43	43	43	43	43	43		43	43	43	43	43
Inspect & Maintain Metasys Controllers - JE	37	37	37	37	37	37	37		37	37	37	37	37	37	37
Inspect & Test Boiler, Gas, 300 Mbh	556	556	556	556	556	556	556	556	556	556	556		556	556	556
Install New Gasket & Bolts Pipe & Fittings, 1" Steel - JE															
Install New Gasket & Bolts Pipe & Fittings, 2" Steel, Gas - JE															
Install New Gasket & Bolts Pipe & Fittings, 3" Steel - JE													4		
Install New Gasket & Bolts Pipe & Fittings, 3/4" Steel - JE															
Maintain Direct Digital Controls, System Points	367	367		367	367	367	367	367	367	367	367	367		367	367
Maintain Expansion Tank, 30 Gal	31	31	31	31	31	31	31	31	31	31	31	31		31	31
Maintain Residential Type Ceiling Fan	31	31	31	31	31	31	31		31	31	31	31	31	31	31
Maintain, 12 Month Air Handler, Multizone, 10,000 Cfm		897	897	897	897	897	897	897	897	897	897	897	897	897	897
Maintain, 12 Month Air Handler, Single Zone, 1,300 Cfm	634	634	634	634	634	634	634		634	634	634	634	634	634	634
Maintain, 12 Month Air Handler, Single Zone, 5,000 Cfm	317	317	317	317	317	317	317	317	317	317	317	317	317		317
Maintain, 12 Month Check Valve, 4.00 In	21	21		21	21	21	21	21	21	21	21	21	21	21	21
Maintain, 12 Month Condenser, Air-Cooled, 10.0 Ton	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52
Maintain, 12 Month Condenser, Air-Cooled, 15.0 Ton	105	105	105		105	105	105	105	105	105	105	105	105	105	105
Maintain, 12 Month Condenser, Air-Cooled, 20.0 Ton	157	157	157	52	157	157	157	157	157	157	157	157	157	157	157
Maintain, 12 Month Condenser, Air-Cooled, 3.0 Ton	105	105	105		105	105	105	105	105	105	105	105	105	105	105
Maintain, 3 Month Air Handler, Multizone, 10,000 Cfm		204	204	204	204	204	204	204	204	204	204	204	204	204	204
Maintain, 3 Month Air Handler, Single Zone, 1,300 Cfm	536	536	536	536	536	536	536		536	536	536	536	536	536	536
Maintain, 3 Month Air Handler, Single Zone, 5,000 Cfm	268	268	268	268	268	268	268	268	268	268	268	268	268		268
Maintain, 3 Month Condenser, Air-Cooled, 10.0 Ton	312	312	312	312	312	312	312	312	312	312	312	312	312	312	312
Maintain, 3 Month Condenser, Air-Cooled, 15.0 Ton	624	624	624		624	624	624	624	624	624	624	624	624	624	624

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - Base Building

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Maintain, 3 Month Condenser, Air-Cooled, 20.0 Ton	936	312	936	936	936	936	936	936	936	936	936	936	936	936	624
Maintain, 3 Month Condenser, Air-Cooled, 3.0 Ton	624		624	624	624	624	624	624	624	624	624	624	624	624	624
Maintain, 6 Month Air Conditioner, Computer Room, Air-Cooled (CRAC), 15.0 Ton	940	940	940	940	940	940		940	940	940	940	940	940	940	940
Maintain, 6 Month Air Conditioner, Computer Room, Air-Cooled (CRAC), 20.0 Ton	1,008	1,008	1,008	1,008	1,008	1,008		1,008	1,008	1,008	1,008	1,008	1,008	1,008	1,008
Maintain, 6 Month Condenser, Air-Cooled, 10.0 Ton	32	32	32	32	32	32	32	32	32	32	32	32	32	32	
Maintain, 6 Month Condenser, Air-Cooled, 15.0 Ton	66		66	66	66	66	66	66	66	66	66	66	66	66	66
Maintain, 6 Month Condenser, Air-Cooled, 20.0 Ton	98	32	98	98	98	98	98	98	98	98	98	98	98	98	66
Maintain, 6 Month Condenser, Air-Cooled, 3.0 Ton	66		66	66	66	66	66	66	66	66	66	66	66	66	66
Maintain, 6 Month Exhaust Fan, Propeller, 375 Cfm	258	258	258		258	258	258	258	258	258	258	258	258	258	258
Maintain, 6 Month Exhaust Fan, Propeller, 800 Cfm	258	258	258	258	258	258	258	258	258	258	258	258	258	258	258
Maintain, 6 Month Exhaust Fan, Roof Mounted, 400 Cfm	258	258	258	258	258	258	258	258	258	258	258	258	258	258	
Maintain, 6 Month Exhaust Fan, Roof Mounted, 500 Cfm	258	258	258	258	258	258	258	258	258		258	258	258	258	258
Minor Repair Metasys Controllers - JE			387										387		
Overhaul Circulator Pump, 1 HP, Hot Water - JE					172										172
Repair Air Conditioner, Computer Room, Air-Cooled (CRAC), 15.0 Ton															
Repair Air Conditioner, Computer Room, Air-Cooled (CRAC), 20.0 Ton															
Repair Air Handler, Multizone, 10,000 Cfm								2,097							
Repair Air Handler, Single Zone, 1,300 Cfm														2,834	
Repair Air Handler, Single Zone, 5,000 Cfm			1,475												
Repair Boiler, Gas, 300 Mbh				2,422							2,422				
Repair Condenser, Air-Cooled, 10.0 Ton										1,032					
Repair Condenser, Air-Cooled, 15.0 Ton														2,294	
Repair Condenser, Air-Cooled, 20.0 Ton										1,323				2,647	
Repair Condenser, Air-Cooled, 3.0 Ton														1,416	
Repair Exhaust Fan, Propeller, 375 Cfm															197
Repair Exhaust Fan, Propeller, 800 Cfm								197							
Repair Exhaust Fan, Roof Mounted, 400 Cfm					197										
Repair Exhaust Fan, Roof Mounted, 500 Cfm								197							
Replace 10' Section Pipe & Fittings, 1" Steel - JE	16												16		

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - Base Building

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Maintain, 3 Month Condenser, Air-Cooled, 20.0 Ton	936	936	936	312	936	936	936	936	936	936	936	936	936	936	936
Maintain, 3 Month Condenser, Air-Cooled, 3.0 Ton	624	624	624		624	624	624	624	624	624	624	624	624	624	624
Maintain, 6 Month Air Conditioner, Computer Room, Air-Cooled (CRAC), 15.0 Ton	940	940	940	940	940	940	940	940	940	940	940	940	940		940
Maintain, 6 Month Air Conditioner, Computer Room, Air-Cooled (CRAC), 20.0 Ton	1,008	1,008	1,008	1,008	1,008	1,008	1,008	1,008	1,008	1,008	1,008	1,008	1,008		1,008
Maintain, 6 Month Condenser, Air-Cooled, 10.0 Ton	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
Maintain, 6 Month Condenser, Air-Cooled, 15.0 Ton	66	66	66		66	66	66	66	66	66	66	66	66	66	66
Maintain, 6 Month Condenser, Air-Cooled, 20.0 Ton	98	98	98	32	98	98	98	98	98	98	98	98	98	98	98
Maintain, 6 Month Condenser, Air-Cooled, 3.0 Ton	66	66	66		66	66	66	66	66	66	66	66	66	66	66
Maintain, 6 Month Exhaust Fan, Propeller, 375 Cfm	258	258	258	258	258	258	258		258	258	258	258	258	258	258
Maintain, 6 Month Exhaust Fan, Propeller, 800 Cfm		258	258	258	258	258	258	258	258	258	258	258	258	258	258
Maintain, 6 Month Exhaust Fan, Roof Mounted, 400 Cfm	258	258	258	258	258	258	258	258	258	258	258	258	258	258	258
Maintain, 6 Month Exhaust Fan, Roof Mounted, 500 Cfm	258	258	258	258	258	258	258	258	258	258	258	258	258		258
Minor Repair Metasys Controllers - JE			387										387		
Overhaul Circulator Pump, 1 HP, Hot Water - JE					172										172
Repair Air Conditioner, Computer Room, Air-Cooled (CRAC), 15.0 Ton			39,181												
Repair Air Conditioner, Computer Room, Air-Cooled (CRAC), 20.0 Ton			49,685												
Repair Air Handler, Multizone, 10,000 Cfm											2,097				
Repair Air Handler, Single Zone, 1,300 Cfm															
Repair Air Handler, Single Zone, 5,000 Cfm					1,475										
Repair Boiler, Gas, 300 Mbh			2,422							2,422					
Repair Condenser, Air-Cooled, 10.0 Ton												1,032			
Repair Condenser, Air-Cooled, 15.0 Ton															
Repair Condenser, Air-Cooled, 20.0 Ton												1,323			
Repair Condenser, Air-Cooled, 3.0 Ton															
Repair Exhaust Fan, Propeller, 375 Cfm															
Repair Exhaust Fan, Propeller, 800 Cfm												197			
Repair Exhaust Fan, Roof Mounted, 400 Cfm											197				
Repair Exhaust Fan, Roof Mounted, 500 Cfm						197									
Replace 10' Section Pipe & Fittings, 1" Steel - JE										16					

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - Base Building

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Replace 10' Section Pipe & Fittings, 2" Steel, Gas - JE	17												17		
Replace 10' Section Pipe & Fittings, 3" Steel - JE		11												11	
Replace 10' Section Pipe & Fittings, 3/4" Steel - JE	20												20		
Replace Air Conditioner, Computer Room, Air-Cooled (CRAC), 15.0 Ton							107,218								
Replace Air Conditioner, Computer Room, Air-Cooled (CRAC), 20.0 Ton							129,328								
Replace Air Handler, Multizone, 10,000 Cfm															
Replace Air Handler, Single Zone, 1,300 Cfm				12,318											
Replace Air Handler, Single Zone, 5,000 Cfm										13,486					
Replace Ball Valve, 2.00 In								1,147							
Replace Boiler, Gas, 300 Mbh															
Replace Calibrated Balancing Valve, 2.00 In												156			
Replace Check Valve, 4.00 In															
Replace Chemical Bypass Pot Feeder - JE															
Replace Circulator Pump, 1 HP, Hot Water - JE										8,952					
Replace Condenser, Air-Cooled, 10.0 Ton															4,781
Replace Condenser, Air-Cooled, 15.0 Ton		13,901													
Replace Condenser, Air-Cooled, 20.0 Ton		20,278													10,139
Replace Condenser, Air-Cooled, 3.0 Ton		3,934													
Replace Direct Digital Controls, System Points								10,425							
Replace Exhaust Fan, Propeller, 375 Cfm				549											
Replace Exhaust Fan, Propeller, 800 Cfm															
Replace Exhaust Fan, Roof Mounted, 400 Cfm															778
Replace Exhaust Fan, Roof Mounted, 500 Cfm										1,006					
Replace Expansion Tank, 30 Gal															
Replace Metasys Controllers - JE								2,286							
Replace Pipe & Fittings, 1" Steel - JE															
Replace Pipe & Fittings, 2" Steel, Gas - JE															
Replace Pipe & Fittings, 3/4" Steel - JE															
Replace Pipe Insulation, Fiberglass, Heating Water/Steam - JE			1,933												

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - Base Building

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Replace 10' Section Pipe & Fittings, 2" Steel, Gas - JE										17					
Replace 10' Section Pipe & Fittings, 3" Steel - JE											11				
Replace 10' Section Pipe & Fittings, 3/4" Steel - JE										20					
Replace Air Conditioner, Computer Room, Air-Cooled (CRAC), 15.0 Ton														107,218	
Replace Air Conditioner, Computer Room, Air-Cooled (CRAC), 20.0 Ton														129,328	
Replace Air Handler, Multizone, 10,000 Cfm	29,663														
Replace Air Handler, Single Zone, 1,300 Cfm								12,318							
Replace Air Handler, Single Zone, 5,000 Cfm														13,486	
Replace Ball Valve, 2.00 In								1,147							
Replace Boiler, Gas, 300 Mbh												9,325			
Replace Calibrated Balancing Valve, 2.00 In														156	
Replace Check Valve, 4.00 In			2,008												
Replace Chemical Bypass Pot Feeder - JE			1,073												
Replace Circulator Pump, 1 HP, Hot Water - JE										8,952					
Replace Condenser, Air-Cooled, 10.0 Ton															
Replace Condenser, Air-Cooled, 15.0 Ton				13,901											
Replace Condenser, Air-Cooled, 20.0 Ton				20,278											
Replace Condenser, Air-Cooled, 3.0 Ton				3,934											
Replace Direct Digital Controls, System Points			10,425										10,425		
Replace Exhaust Fan, Propeller, 375 Cfm								549							
Replace Exhaust Fan, Propeller, 800 Cfm	914														
Replace Exhaust Fan, Roof Mounted, 400 Cfm															
Replace Exhaust Fan, Roof Mounted, 500 Cfm														1,006	
Replace Expansion Tank, 30 Gal													1,812		
Replace Metasys Controllers - JE								2,286							
Replace Pipe & Fittings, 1" Steel - JE													1,646		
Replace Pipe & Fittings, 2" Steel, Gas - JE													1,744		
Replace Pipe & Fittings, 3/4" Steel - JE													1,419		
Replace Pipe Insulation, Fiberglass, Heating Water/Steam - JE													1,933		

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - Base Building

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Replace Residential Type Ceiling Fan				477											
Replace Secondary Coil, 288 Sq In															
Re-tape Pipe Insulation, Fiberglass, Heating Water/Steam - JE								389					389		
D40 Fire Protection															
Inspect & Maintain Fire Annunciator Panel - JE	31	31	31	31	31	31	31		31	31	31	31	31	31	31
Inspect & Test Fire Extinguisher	18	18	18	18		18	18	18	18	18	18	18	18	18	18
Maintain, 1 Month Fire Extinguisher	276	276	276	276		276	276	276	276	276	276	276	276	276	276
Maintain, 12 Month Fire Extinguisher	16	16	16	16		16	16	16	16	16	16	16	16	16	16
Replace Fire Annunciator Panel - JE								889							
Replace Fire Extinguisher					1,760										
D50 Electrical															
Annual PM Circuit Breaker, 15/20 Amp. - JE	113	113	113	113	111	93	113	113	107	113	113	113	90	113	68
Check & Adjust Manual Pull Station			83												
Check Operation Smoke Detector, Duct	45	45	45	45	45	45	45		45	45	45	45	45	45	45
Inspect & Clean Motor Starter, 2.000 HP, 208 V	82	82	82	82	82	82	82	82	82	82	82	82	82		82
Inspect & Maintain Security Control Panel	1,416	1,416	1,416	1,416	1,416	1,416	1,416	1,416	1,416	1,416	1,416	1,416	1,416	1,416	
Maintain & Repair General Wiring Lightning Protection - JE	54	54	54	54	54	54	54	54	54	54	54	54	54	54	54
Maintain Card Reader	4,249	4,249	4,249	4,249		4,249	4,249	4,249	4,249	4,249	4,249	4,249	4,249	4,249	
Maintain Circuit Breaker, 3 Ph., 600 V, 100 Amp	916	916	916	916	916	827	916	916	916	916	916	916	916	916	414
Maintain Circuit Breaker, 3 Ph., 600 V, 60 Amp	1,270	1,270	1,270	1,270	1,270	1,211	1,270	1,270	1,270	1,270	1,270	1,270	1,270	1,270	886
Maintain Circuit Breaker, 600 V, 400 Amp	680	680	680	680	650	680	680	680	680	680	680	680	680	680	385
Maintain Circuit Breaker, Main, 208 Y, 120 V, 1,200 Amp	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Maintain Disconnect Switch, 200 Amp	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206
Maintain Disconnect Switch, 30 Amp	411	411	411	411	411	411	411	411	411	411	411	411	411	411	411
Maintain Disconnect Switch, 60 Amp	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206
Maintain Intercom Speaker	60	60	60	60		60	60	60	60	60	60	60	60	60	60
Maintain Intrusion Detection Motion Detector, Interior	89	89	89	89		89	89	89	89	89	89	89	89	89	
Maintain Power Panel Board, 208 Y, 120 V, 1,200 Amp	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39
Maintain Power Panel Board, 208 Y, 120 V, 100 Amp	344	344	344	344	344	344	344	344	275	344	344	344	344	344	138

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - Base Building

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Replace Residential Type Ceiling Fan								477							
Replace Secondary Coil, 288 Sq In							4,090								
Re-tape Pipe Insulation, Fiberglass, Heating Water/Steam - JE			389					389							
D40 Fire Protection															
Inspect & Maintain Fire Annunciator Panel - JE	31	31	31	31	31	31	31		31	31	31	31	31	31	31
Inspect & Test Fire Extinguisher	18		18	18	18	18	18	18	18	18	18	18	18		18
Maintain, 1 Month Fire Extinguisher	276		276	276	276	276	276	276	276	276	276	276	276		276
Maintain, 12 Month Fire Extinguisher	16		16	16	16	16	16	16	16	16	16	16	16		16
Replace Fire Annunciator Panel - JE								889							
Replace Fire Extinguisher		1,760												1,760	
D50 Electrical															
Annual PM Circuit Breaker, 15/20 Amp. - JE	113	113	113	113	113	113	113	113	113	113	113	113	113	99	110
Check & Adjust Manual Pull Station			83												
Check Operation Smoke Detector, Duct	45	45	45	45	45	45	45		45	45	45	45	45	45	45
Inspect & Clean Motor Starter, 2.000 HP, 208 V	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82
Inspect & Maintain Security Control Panel	1,416	1,416	1,416	1,416	1,416	1,416	1,416	1,416	1,416	1,416	1,416	1,416	1,416	1,416	
Maintain & Repair General Wiring Lightning Protection - JE	54	54	54	54	54	54		54	54	54	54	54	54	54	54
Maintain Card Reader	4,249	4,249	4,249	4,249	4,249	4,249	4,249	4,249	4,249		4,249	4,249	4,249	4,249	4,249
Maintain Circuit Breaker, 3 Ph., 600 V, 100 Amp	916	916	916	857	916	916	916	916	916	916	916	916	916	916	916
Maintain Circuit Breaker, 3 Ph., 600 V, 60 Amp	1,270	1,270	1,270	1,152	1,270	1,270	1,270	1,270	1,270	1,270	1,270	1,270	1,270	1,270	1,270
Maintain Circuit Breaker, 600 V, 400 Amp	680	680	680	621	680	680	680	680	680	680	680	680	680	680	680
Maintain Circuit Breaker, Main, 208 Y, 120 V, 1,200 Amp	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Maintain Disconnect Switch, 200 Amp	206	206	206	206	69	206	206	206	206	206	206	206	206	206	206
Maintain Disconnect Switch, 30 Amp	411	411	411	411	411	411	411	411	411	411	411	411	411	411	411
Maintain Disconnect Switch, 60 Amp	206	206	206	206	206	206	206	206	206	206	206	206	137	206	206
Maintain Intercom Speaker	60	60	60	60	60	60	60	60	60		60	60	60	60	60
Maintain Intrusion Detection Motion Detector, Interior	89	89	89	89	89	89	89	89	89		89	89	89	89	89
Maintain Power Panel Board, 208 Y, 120 V, 1,200 Amp	39	39	39	39	39	39	39	39	39	39	39	39	39	39	
Maintain Power Panel Board, 208 Y, 120 V, 100 Amp	344	344	344	344	344	344	344	344	344	344	344	344	344	275	344

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - Base Building

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Maintain Power Panel Board, 208 Y, 120 V, 200 Amp	276	276	276	276	207	276	276	276	276	276	276	276	138	276	207
Maintain Power Panel Board, 208 Y, 120 V, 225 Amp	619	619	619	619	619	482	619	619	550	619	619	619	550	619	413
Maintain Power Panel Board, 208 Y, 120 V, 400 Amp	137	137	137	137	137	137	137	137	137	137	137	137	137	137	
Maintain Power Panel Board, 208 Y, 120 V, 600 Amp	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39
Maintain Power Panel Board, 480 Y, 277 V, 200 Amp	69	69	69	69	69	69	69	69	69	69	69	69	69	69	
Maintain Public Address Speaker	90	90	90	90	90	90	90	90	90	90	90	90	90	90	
Maintain Secondary Transformer, Dry, 150 kVA	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78
Maintain Transient Voltage Surge Suppression Panel	52	52	52	52	52	52	52	52	52	52	52	52	52	52	26
Maintain, 12 Month Camera, Exterior, Closed Circuit, Fixed Color	107	107	107	107		107	107	107	107	107	107	107	107	107	
Maintain, 12 Month Camera, Interior, Closed Circuit, Fixed Color	321	321	321	321		321	321	321	321	321	321	321	321	321	
Maintain, 12 Month Power Panel Board, 208 Y, 120 V, 1,200 Amp	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82
Maintain, 12 Month Power Panel Board, 208 Y, 120 V, 600 Amp	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82
Maintain, 12 Month Secondary Transformer, Dry, 150 kVA	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78
Maintain, 36 Month Secondary Transformer, Dry, 150 kVA			22			22			22			22			22
Repair Circuit Breaker, 15/20 Amp. - JE			616		1,177				358	78					47
Repair Circuit Breaker, 3 Ph., 600 V, 100 Amp			881		7,933				881	2,644			881		441
Repair Circuit Breaker, 3 Ph., 600 V, 60 Amp			3,085		5,729				9,255				3,085		
Repair Circuit Breaker, 600 V, 400 Amp			441		4,407				1,322	3,526			441		441
Repair Circuit Breaker, Main, 208 Y, 120 V, 1,200 Amp										534					
Repair Disconnect Switch, 200 Amp					106					212					106
Repair Disconnect Switch, 30 Amp					493										493
Repair Disconnect Switch, 60 Amp					173			86							173
Repair Power Panel Board, 208 Y, 120 V, 1,200 Amp										68					
Repair Power Panel Board, 208 Y, 120 V, 100 Amp					205				68						
Repair Power Panel Board, 208 Y, 120 V, 200 Amp			136		68										68
Repair Power Panel Board, 208 Y, 120 V, 225 Amp			68		205				68	68					
Repair Power Panel Board, 208 Y, 120 V, 400 Amp					137										
Repair Power Panel Board, 208 Y, 120 V, 600 Amp									68						
Repair Power Panel Board, 480 Y, 277 V, 200 Amp					68										

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - Base Building

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Maintain Power Panel Board, 208 Y, 120 V, 200 Amp	276	276	276	276	276	276	276	276	276	276	276	276	276	276	276
Maintain Power Panel Board, 208 Y, 120 V, 225 Amp	619	619	619	619	619	619	619	619	619	619	619	619	619	550	550
Maintain Power Panel Board, 208 Y, 120 V, 400 Amp	137	137	137	137	137	137	137	137	137	137	137	137	137	137	137
Maintain Power Panel Board, 208 Y, 120 V, 600 Amp	39	39	39	39	39	39	39	39	39	39	39	39	39		39
Maintain Power Panel Board, 480 Y, 277 V, 200 Amp	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69
Maintain Public Address Speaker	90	90	90	90	90	90	90	90	90	90	90	90	90	90	
Maintain Secondary Transformer, Dry, 150 kVA	78	78	78	78	78	78	78	78	78	78	78	78	78	78	
Maintain Transient Voltage Surge Suppression Panel	52	52	52	52	52	52	52	52	52	52	52	52	52	52	26
Maintain, 12 Month Camera, Exterior, Closed Circuit, Fixed Color	107	107	107	107	107	107	107	107	107		107	107	107	107	107
Maintain, 12 Month Camera, Interior, Closed Circuit, Fixed Color	321	321	321	321	321	321	321	321	321		321	321	321	321	321
Maintain, 12 Month Power Panel Board, 208 Y, 120 V, 1,200 Amp	82	82	82	82	82	82	82	82	82	82	82	82	82	82	
Maintain, 12 Month Power Panel Board, 208 Y, 120 V, 600 Amp	82	82	82	82	82	82	82	82	82	82	82	82	82		82
Maintain, 12 Month Secondary Transformer, Dry, 150 kVA	78	78	78	78	78	78	78	78	78	78	78	78	78	78	
Maintain, 36 Month Secondary Transformer, Dry, 150 kVA			22			22			22			22			
Repair Circuit Breaker, 15/20 Amp. - JE	530			514	78			616		1,224	530			156	
Repair Circuit Breaker, 3 Ph., 600 V, 100 Amp	1,322				2,644			881		7,933	1,322			881	2,644
Repair Circuit Breaker, 3 Ph., 600 V, 60 Amp	881			7,492				3,085		5,729	881			9,255	
Repair Circuit Breaker, 600 V, 400 Amp				441	3,526			441		4,848				1,322	3,526
Repair Circuit Breaker, Main, 208 Y, 120 V, 1,200 Amp					534										534
Repair Disconnect Switch, 200 Amp										106					212
Repair Disconnect Switch, 30 Amp										493					
Repair Disconnect Switch, 60 Amp			86							173					
Repair Power Panel Board, 208 Y, 120 V, 1,200 Amp					68										
Repair Power Panel Board, 208 Y, 120 V, 100 Amp				136						205				68	
Repair Power Panel Board, 208 Y, 120 V, 200 Amp								136		136					
Repair Power Panel Board, 208 Y, 120 V, 225 Amp	137			136	68			68		205	137			68	
Repair Power Panel Board, 208 Y, 120 V, 400 Amp										137					
Repair Power Panel Board, 208 Y, 120 V, 600 Amp				68											
Repair Power Panel Board, 480 Y, 277 V, 200 Amp										68					

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - Base Building

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Repair Secondary Transformer, Dry, 150 kVA										319					
Repair Security Control Panel					1,627					1,627					
Repair Smoke Detector			1,058												
Repair Smoke Detector, Duct			88												
Repair Wiring Device, Switch			2,188		143										
Replace Ballast & Lamp Compact Fluorescent Lighting Fixture, Digital Addressable Ballast, 32 W															2,217
Replace Ballast & Lamp High Pressure Sodium Lighting Fixture, 250 W									239						
Replace Ballast & Lamps Fluorescent Lighting Fixture, T12, 40 W			1,540						560						
Replace Ballast & Lamps Fluorescent Lighting Fixture, T8, 25 W															1,695
Replace Ballast & Lamps Fluorescent Lighting Fixture, T8, 32 W															6,190
Replace Ballast Metal Halide Lighting Fixture, Wall Mount, 150 W									146						
Replace Batteries & Check Operation Smoke Detector	464	464	464	464	464	464	464		464	464	464	464	464	464	464
Replace Camera, Exterior, Closed Circuit, Fixed Color					3,283										3,283
Replace Camera, Interior, Closed Circuit, Fixed Color					5,318										5,318
Replace Card Reader					3,713										3,713
Replace Circuit Breaker, 15/20 Amp. - JE					180	2,036			599				2,366		4,522
Replace Circuit Breaker, 3 Ph., 600 V, 100 Amp						3,980									22,552
Replace Circuit Breaker, 3 Ph., 600 V, 60 Amp						2,406									15,636
Replace Circuit Breaker, 600 V, 400 Amp					4,274										42,742
Replace Coil Motor Starter, 2.000 HP, 208 V		426			426			426			426				
Replace Compact Fluorescent Lighting Fixture, Digital Addressable Ballast, 32 W					1,036										
Replace Disconnect Switch, 200 Amp															
Replace Disconnect Switch, 60 Amp															
Replace Electronic Lock					1,066										1,066
Replace Fire Alarm Horn & Strobe													4,108		
Replace Fluorescent Lighting Fixture, T12, 40 W													3,432		
Replace Fluorescent Lighting Fixture, T8, 25 W					3,744										
Replace Fluorescent Lighting Fixture, T8, 32 W					12,168										
Replace Grounded Fault Circuit Interrupter, 15 Amp					404						173				

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - Base Building

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Repair Secondary Transformer, Dry, 150 kVA					319										
Repair Security Control Panel					1,627					1,627					
Repair Smoke Detector			1,058												
Repair Smoke Detector, Duct			88												
Repair Wiring Device, Switch								2,188		143					
Replace Ballast & Lamp Compact Fluorescent Lighting Fixture, Digital Addressable Ballast, 32 W															
Replace Ballast & Lamp High Pressure Sodium Lighting Fixture, 250 W														239	
Replace Ballast & Lamps Fluorescent Lighting Fixture, T12, 40 W								1,540						560	
Replace Ballast & Lamps Fluorescent Lighting Fixture, T8, 25 W															
Replace Ballast & Lamps Fluorescent Lighting Fixture, T8, 32 W															
Replace Ballast Metal Halide Lighting Fixture, Wall Mount, 150 W														146	
Replace Batteries & Check Operation Smoke Detector	464	464	464	464	464	464	464		464	464	464	464	464	464	464
Replace Camera, Exterior, Closed Circuit, Fixed Color										3,283					
Replace Camera, Interior, Closed Circuit, Fixed Color										5,318					
Replace Card Reader										3,713					
Replace Circuit Breaker, 15/20 Amp. - JE														1,377	299
Replace Circuit Breaker, 3 Ph., 600 V, 100 Amp				2,653											
Replace Circuit Breaker, 3 Ph., 600 V, 60 Amp				4,811											
Replace Circuit Breaker, 600 V, 400 Amp				8,548											
Replace Coil Motor Starter, 2.000 HP, 208 V		426			426			426			426			426	
Replace Compact Fluorescent Lighting Fixture, Digital Addressable Ballast, 32 W										1,036					
Replace Disconnect Switch, 200 Amp					2,967										
Replace Disconnect Switch, 60 Amp													747		
Replace Electronic Lock										1,066					
Replace Fire Alarm Horn & Strobe															
Replace Fluorescent Lighting Fixture, T12, 40 W				1,248											
Replace Fluorescent Lighting Fixture, T8, 25 W										3,744					
Replace Fluorescent Lighting Fixture, T8, 32 W										12,168					
Replace Grounded Fault Circuit Interrupter, 15 Amp										404					

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - Base Building

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Replace Halogen Lighting Fixture, 100 W													219		
Replace High Pressure Sodium Lighting Fixture, 250 W															
Replace Incandescent Lighting Fixture, Basic, 100 W													1,508		
Replace Intercom Speaker					884										
Replace Intrusion Detection Motion Detector, Interior					1,716										1,716
Replace Lamp Halogen Lighting Fixture, 100 W			19					19							
Replace Lamp Incandescent Lighting Fixture, Basic, 100 W			76					76							
Replace Lamp LED Lighting Fixture, Basic, 11 W							38								
Replace Lamp Metal Halide Lighting Fixture, Wall Mount, 150 W				65					65					65	
Replace LED Lighting Fixture, Basic, 11 W															
Replace Lightning Protection - JE															
Replace Manual Pull Station								187							
Replace Metal Halide Lighting Fixture, Wall Mount, 150 W															
Replace Monitor, Medium, Closed Circuit					3,272										3,272
Replace Motor Starter, 2.000 HP, 208 V														1,366	
Replace Power Panel Board, 208 Y, 120 V, 1,200 Amp															
Replace Power Panel Board, 208 Y, 120 V, 100 Amp									3,809						11,427
Replace Power Panel Board, 208 Y, 120 V, 200 Amp					5,199								10,398		5,199
Replace Power Panel Board, 208 Y, 120 V, 225 Amp						12,292			6,146				6,146		18,439
Replace Power Panel Board, 208 Y, 120 V, 400 Amp															14,588
Replace Power Panel Board, 208 Y, 120 V, 600 Amp															
Replace Power Panel Board, 480 Y, 277 V, 200 Amp															6,861
Replace Public Address Speaker															1,850
Replace Receptacle, 120 V, 20 Amp					881								10,220		
Replace Remote Door Release System - JE								1,646							
Replace Secondary Transformer, Dry, 150 kVA															
Replace Security Control Panel															24,466
Replace Smoke Detector								4,557							
Replace Smoke Detector, Duct								1,263							

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - Base Building

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Replace Halogen Lighting Fixture, 100 W															
Replace High Pressure Sodium Lighting Fixture, 250 W				1,462											
Replace Incandescent Lighting Fixture, Basic, 100 W															
Replace Intercom Speaker										884					
Replace Intrusion Detection Motion Detector, Interior										1,716					
Replace Lamp Halogen Lighting Fixture, 100 W			19					19					19		
Replace Lamp Incandescent Lighting Fixture, Basic, 100 W			76					76					76		
Replace Lamp LED Lighting Fixture, Basic, 11 W												38			
Replace Lamp Metal Halide Lighting Fixture, Wall Mount, 150 W									65					65	
Replace LED Lighting Fixture, Basic, 11 W		286													
Replace Lightning Protection - JE							2,315								
Replace Manual Pull Station								187							
Replace Metal Halide Lighting Fixture, Wall Mount, 150 W				429											
Replace Monitor, Medium, Closed Circuit										3,272					
Replace Motor Starter, 2.000 HP, 208 V															
Replace Power Panel Board, 208 Y, 120 V, 1,200 Amp															11,826
Replace Power Panel Board, 208 Y, 120 V, 100 Amp														3,809	
Replace Power Panel Board, 208 Y, 120 V, 200 Amp															
Replace Power Panel Board, 208 Y, 120 V, 225 Amp														6,146	6,146
Replace Power Panel Board, 208 Y, 120 V, 400 Amp															
Replace Power Panel Board, 208 Y, 120 V, 600 Amp														8,427	
Replace Power Panel Board, 480 Y, 277 V, 200 Amp															
Replace Public Address Speaker															1,850
Replace Receptacle, 120 V, 20 Amp										881					
Replace Remote Door Release System - JE								1,646							
Replace Secondary Transformer, Dry, 150 kVA															11,859
Replace Security Control Panel															24,466
Replace Smoke Detector								4,557							
Replace Smoke Detector, Duct								1,263							

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - Base Building

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Replace Transient Voltage Surge Suppression Panel															603
Replace Wiring Device, Switch													2,473		161
E10 Equipment															
Maintain Kitchen Exhaust Hood, Domestic - JE	39	39	39	39	39	39	39	39	39	39	39	39	39	39	
Maintain, 12 Month Kitchen Exhaust Hood, Commercial	57	57	57	57	57	57	57	57	57	57	57	57	57	57	
Maintain, 6 Month Cooking Range, Commercial	230	230	230	230		230	230	230	230	230	230	230	230	230	
Maintain, 6 Month Dishwasher, Electric	486	486	486	486		486	486	486	486	486	486	486	486	486	
Maintain, 6 Month Disposal, Garbage, Electric	256	256	256	256		256	256	256	256	256	256	256	256	256	
Maintain, 6 Month Kitchen Exhaust Hood, Commercial	192	192	192	192	192	192	192	192	192	192	192	192	192	192	
Maintain, 6 Month Range/Oven	436	436	436	436	218	436	436	436	218	436	436	436	436	436	218
Replace Cooking Range, Commercial					2,322										2,322
Replace Dishwasher, Electric					5,259										5,259
Replace Disposal, Garbage, Electric					801										801
Replace Kitchen Cabinet, Wood - JE					14,510										14,510
Replace Kitchen Exhaust Hood, Commercial															6,005
Replace Kitchen Exhaust Hood, Domestic - JE															481
Replace Microwave Oven					238										238
Replace Range/Oven					4,594				4,594						4,594
Replace Refrigerator, Domestic					1,203	2,405			1,203						1,203
G20 Site Improvements															
Maintain Chain Link Fence, 8 Ln Ft	1,875	1,875	1,875	1,875	1,875	1,875	1,875	1,875	1,875	1,875	1,875	1,875	1,875	1,875	
Maintain, 6 Month Sliding Gate, Motor Operated	100	100	100	100		100	100	100	100	100	100	100	100	100	100
Repair Asphaltic Pavement, Parking Lot, >10,000 sq.ft - JE								12,142							
Replace Chain Link Fence, 8 Ln Ft															54,744
Replace Concrete Curb & Gutter - JE			11,148												
Replace Concrete Sidewalk, 4" Thick - JE			11,934												
Replace Motor Sliding Gate, Motor Operated															545
Replace Sliding Gate, Motor Operated					4,853										
Resurface Asphaltic Pavement, Parking Lot, >10,000 sq.ft - JE			97,694										97,694		

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - Base Building

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Replace Transient Voltage Surge Suppression Panel															603
Replace Wiring Device, Switch													2,473		161
E10 Equipment															
Maintain Kitchen Exhaust Hood, Domestic - JE	39	39	39	39	39	39	39	39	39	39	39	39	39	39	
Maintain, 12 Month Kitchen Exhaust Hood, Commercial	57	57	57	57	57	57	57	57	57	57	57	57	57	57	
Maintain, 6 Month Cooking Range, Commercial	230	230	230	230	230	230	230	230	230		230	230	230	230	230
Maintain, 6 Month Dishwasher, Electric	486	486	486	486	486	486	486	486	486		486	486	486	486	486
Maintain, 6 Month Disposal, Garbage, Electric	256	256	256	256	256	256	256	256	256		256	256	256	256	256
Maintain, 6 Month Kitchen Exhaust Hood, Commercial	192	192	192	192	192	192	192	192	192	192	192	192	192	192	
Maintain, 6 Month Range/Oven	436	436	436	218	436	436	436	436	436	218	436	436	436	218	436
Replace Cooking Range, Commercial										2,322					
Replace Dishwasher, Electric										5,259					
Replace Disposal, Garbage, Electric										801					
Replace Kitchen Cabinet, Wood - JE										14,510					
Replace Kitchen Exhaust Hood, Commercial															6,005
Replace Kitchen Exhaust Hood, Domestic - JE															481
Replace Microwave Oven										238					
Replace Range/Oven				4,594						4,594				4,594	
Replace Refrigerator, Domestic	2,405			1,203						1,203	2,405			1,203	
G20 Site Improvements															
Maintain Chain Link Fence, 8 Ln Ft	1,875	1,875	1,875	1,875	1,875	1,875	1,875	1,875	1,875	1,875	1,875	1,875	1,875	1,875	1,875
Maintain, 6 Month Sliding Gate, Motor Operated	100	100	100	100	100	100	100	100	100		100	100	100	100	100
Repair Asphaltic Pavement, Parking Lot, >10,000 sq.ft - JE			12,142										12,142		
Replace Chain Link Fence, 8 Ln Ft															
Replace Concrete Curb & Gutter - JE													11,148		
Replace Concrete Sidewalk, 4" Thick - JE				8,500									11,934		
Replace Motor Sliding Gate, Motor Operated															
Replace Sliding Gate, Motor Operated										4,853					
Resurface Asphaltic Pavement, Parking Lot, >10,000 sq.ft - JE								97,694							

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - Base Building

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
G40 Site Electrical Utilities															
Replace 400W H.P.S. Lamp Outdoor Pole Light - JE			1,125							563					
Replace Concrete Base Outdoor Pole Light - JE													761		
Replace Outdoor Pole Light - JE													5,273		

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - Base Building

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
G40 Site Electrical Utilities															
Replace 400W H.P.S. Lamp Outdoor Pole Light - JE								1,125							563
Replace Concrete Base Outdoor Pole Light - JE					380										
Replace Outdoor Pole Light - JE					2,637										

All costs expressed in ($) 2019

Tab 4 Building Reports, E/G Building
Average M&R Costs
Most Costly M&R Tasks
Yearly M&R Cost Profile Chart
Building Extended Component List with Remaining Service Life
Building Deferred Maintenance Detail
M&R Costs by System per Year Chart
M&R Costs by Task per Year

TUL - EG Building Average M&R Costs

JACOBS

Facility:	TUL - Tulsa, OK	**PRV:**	$1,060,433
City:	Tulsa, OK	**Build Date:**	1988
Building:	TUL - EG Building	**GSFT:**	800

M&R Average Annual Cost Forecasts

	Current Year	5 Year	10 year	20 year	30 Year
Preventive Maintenace:	$11,310	$10,684	$10,996	$11,003	$10,960
Unscheduled Maintenance:	$13,577	$12,766	$13,347	$13,342	$13,295
Repair:	$421	$3,609	$2,885	$2,648	$2,615
Replacement:	$213	$9,282	$20,277	$23,973	$22,380
Total M&R Costs:	$25,521	$36,341	$47,505	$50,966	$49,250
Per GSFT:	$31.90	$45.43	$59.38	$63.71	$61.56
As % of PRV:	2.41%	3.43%	4.48%	4.81%	4.64%

All cost expressed in ($) 2019

TUL - EG Building - Most Costly M&R Tasks

JACOBS

Building: TUL - EG Building
Facility: TUL - Tulsa, OK
City: Tulsa, OK

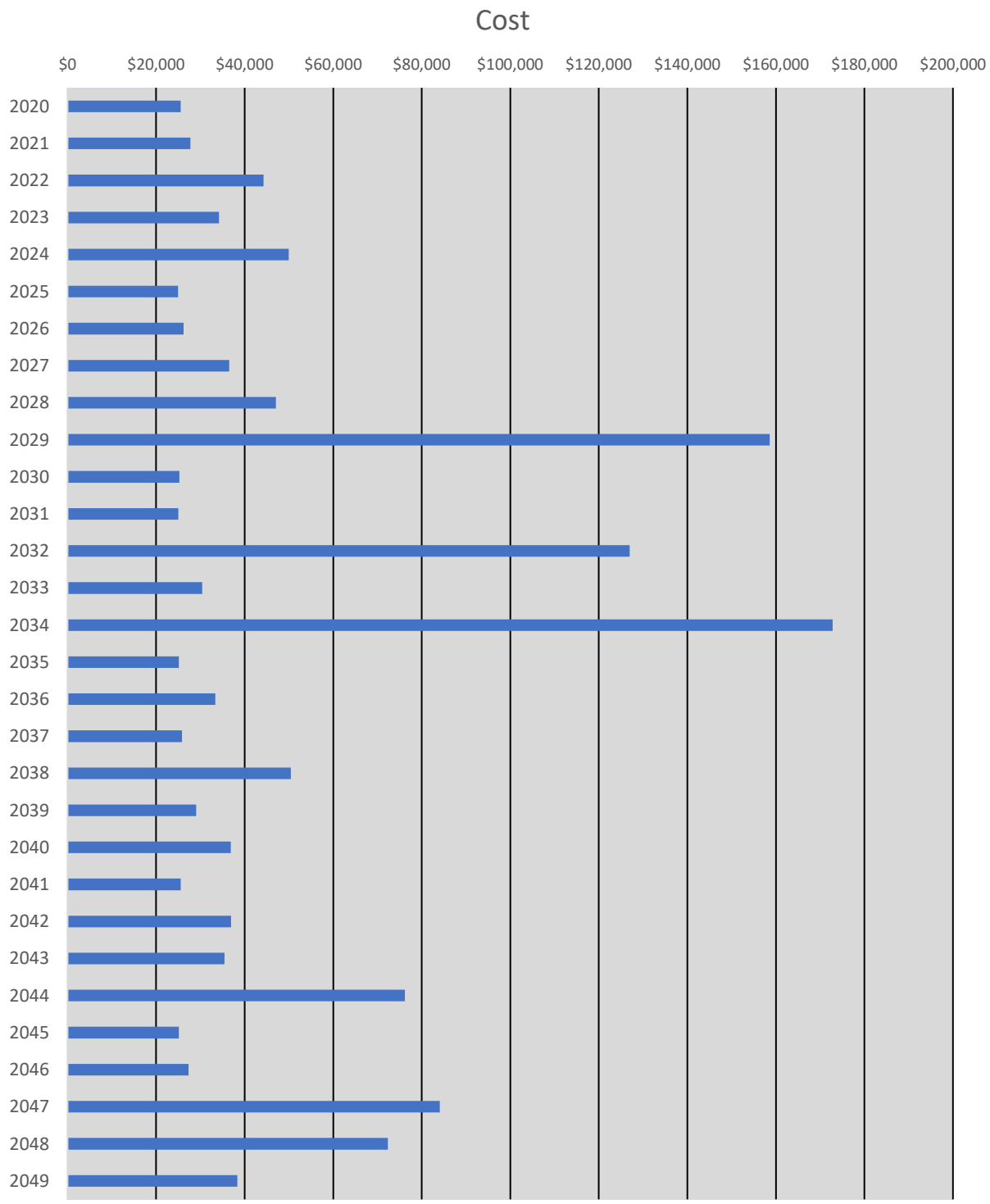
Average Built Date: 1988
30-Year Total M&R: $1,078,648
GSFT: 800

Task	30-Year Total Cost	Percent of Total M&R
Replace Generator, Diesel, 300 kW	$135,975	12.61%
Replace Uninterruptible Power Supply, 100 KW - JE	$120,956	11.21%
Replace Circuit Breaker, 600 V, 400 Amp	$68,387	6.34%
Replace UPS Battery - JE	$49,890	4.63%
Annual PM UPS Battery - JE	$47,817	4.43%
Annual PM Uninterruptible Power Supply, 100 KW - JE	$44,604	4.14%
Replace Transfer Switch, Auto, 600 V, 600 Amp	$25,840	2.40%
Repair Circuit Breaker, 600 V, 400 Amp	$23,357	2.17%
Replace Air Conditioner, Rooftop, Single Zone, 7.5 Ton	$22,976	2.13%
Replace Load Bank, 300 KW - JE	$20,726	1.92%
Maintain, 1 Month Generator, Diesel, 300 kW	$20,532	1.90%
Maintain Air Conditioner, Rooftop, Single Zone, 7.5 Ton	$19,964	1.85%
Maintain Circuit Breaker, 600 V, 400 Amp	$19,927	1.85%
Replace Power Panel Board, 480 Y, 277 V, 600 Amp	$19,421	1.80%
Replace Power Panel Board, 208 Y, 120 V, 800 Amp	$19,119	1.77%
Replace Circuit Breaker, Main, 208 Y, 120 V, 600 Amp	$18,721	1.74%
Replace Load Bank, 200 kW	$16,413	1.52%
Replace Air Handler, Single Zone, 2,500 Cfm	$15,294	1.42%
Replace Power Panel Board, 208 Y, 120 V, 400 Amp	$14,588	1.35%
Electrical Testing Generator, Diesel, 300 kW	$13,572	1.26%
Inspect & Clean Transfer Switch, Auto, 600 V, 600 Amp	$13,104	1.21%
Replace Secondary Transformer, Dry, 150 kVA	$11,859	1.10%
Replace Power Panel Board, 480 Y, 277 V, 800 Amp	$11,017	1.02%
Replace Fuel Tank, 2000 Gal. - JE	$10,137	0.94%
Replace Circuit Breaker, Main, 208 Y, 120 V, 800 Amp	$9,882	0.92%
Maintain, 6 Month Generator, Diesel, 300 kW	$9,744	0.90%
Replace Control Panel, Load Bank - JE	$9,708	0.90%
Maintain, 12 Month Air Handler, Single Zone, 2,500 Cfm	$8,876	0.82%
Maintain, 3 Month Condenser, Air-Cooled, 7.5 Ton	$8,736	0.81%
Replace Circuit Breaker, 3 Ph., 600 V, 100 Amp	$7,960	0.74%
Repair Circuit Breaker, 3 Ph., 600 V, 100 Amp	$7,931	0.74%

All costs expressed in ($) 2019

Building: TUL - EG Building

Facility: TUL - Tulsa, OK **City:** Tulsa, OK



All costs expressed in ($) 2019

Building Extended Component List with Remaining Service Life

JACOBS 2/18/2020

Building: TUL - EG Building
Facility: TUL - Tulsa, OK
City: Tulsa, OK

Last Inspection Date: 11/20/2019
Year Built: 1988
Replacement Value: $1,060,433 **per SF:** $1,326

Building Notes:

Building Gsft: 800

Uniformat	Equip ID	Component	Install Year	Remaining Service Life	Quantity	Deferred Maintenance	Location	Note
B1020		Steel Roof Access Ladder	1988	8	13 LnFt			
B2010		Aluminum Louver, 1 Story	1988	28	3 Each			
B2010		Clay Brick, Exterior, 1 Story	1988	43	1,411 SqFt			
B2030		Steel, Painted, Exterior Door	1988	-1	1 Each	$896		
B2030		Steel, Painted, Exterior Double Door	1988	-1	2 Each	$4,054		
B3010		Aluminum Gutter, Downspouts, Fittings	1988	-12	0.024 KLnFt	$112		
B3010		Flashing - JE	2016	16	118 LnFt			
B3010		Single-Ply PVC Membrane Roof - JE	2016	16	800 SqFt			TPO
C1020		Steel, Painted, Interior Door	1988	43	2 Each			
C2010		Metal, Painted, Exterior Railing	2016	26	22 LnFt		Roof	
C3010		Concrete Block, Painted, Interior Wall Finish	1988	43	1,109 SqFt			
C3010		Gypsum Board, Interior Wall Finish	1988	43	568 SqFt			
C3020		Concrete, Painted Flooring	1988	43	640 SqFt			
C3030		Metal Ceiling	1988	43	640 SqFt			Exposed Structure
D2020		Pipe & Fittings, 3/4" Copper - JE	1988	-7	0.026 KLnFt	$784		
D2020		Pipe Insulation, Fiberglass, Cold Water - JE	1988	-7	0.026 KLnFt	$97		
D3010	FLM-1	Controller, Fuel Oil Level - JE	2019	14	1 Each			
D3010	FT-1	Fuel Tank, 2000 Gal. - JE	2018	23	1 Each		Grade	1,500 Gallons
D3010	DT-1	Generator Day Tank, 65 Gal	2004	14	1 Each			
D3030	CU-3	Condenser, Air-Cooled, 7.5 Ton	2004	1	1 Each		Grade	90 MBH
D3040	AHU-3	Air Handler, Single Zone, 2,500 Cfm	2004	3	1 Each			3,000 Cfm
D3040		Duct Insulation, Fiberglass - JE	1988	3	186 SqFt			
D3040		Ductwork - JE	1988	3	232 Lbs			
D3040	EF-2	Exhaust Fan, Propeller, 1,000 Cfm	2004	3	1 Each			1,380 Cfm
D3040	TF-1	Exhaust Fan, Propeller, 375 Cfm	2005	4	1 Each			465 Cfm, Dual Prop Fan
D3050	RTU-1	Air Conditioner, Rooftop, Single Zone, 7.5 Ton	2010	7	1 Each			90 MBH
D3050	EUH-1, EUH-2	Unit Heater, Electric - JE	1988	-17	2 Each	$1,784		3 kW
D3060		Thermostat	2010	0	1 Each			
D3060		Thermostat	2004	-6	1 Each	$213		
D3060		Thermostat	1988	-22	2 Each	$427		
D5010		Circuit Breaker, 15/20 Amp. - JE	1988	-2	25 Each	$749		

All costs expressed in ($) 2019

Uniformat	Equip ID	Component	Install Year	Remaining Service Life	Quantity	Deferred Maintenance	Location	Note
D5010		Circuit Breaker, 3 Ph., 600 V, 100 Amp	2002	12	2 Each			70-100 Amp
D5010		Circuit Breaker, 3 Ph., 600 V, 100 Amp	2004	14	1 Each			100 Amp Enclosed Circuit Breaker
D5010		Circuit Breaker, 3 Ph., 600 V, 100 Amp	2004	14	3 Each			70-100 Amp
D5010		Circuit Breaker, 3 Ph., 600 V, 100 Amp	1988	-2	2 Each	$2,653		70-100 Amp
D5010		Circuit Breaker, 3 Ph., 600 V, 60 Amp	2004	14	2 Each			30-60 Amp
D5010		Circuit Breaker, 3 Ph., 600 V, 60 Amp	1988	-2	3 Each	$3,608		30-60 Amp
D5010		Circuit Breaker, 600 V, 400 Amp	2002	12	6 Each			125-400 Amp
D5010		Circuit Breaker, 600 V, 400 Amp	2004	14	1 Each			450 Amp Enclosed Circuit Breaker
D5010		Circuit Breaker, 600 V, 400 Amp	2004	14	9 Each			125-400 Amp
D5010		Circuit Breaker, 600 V, 400 Amp	1988	-2	7 Each	$29,920		125-400 Amp
D5010		Circuit Breaker, Main, 208 Y, 120 V, 600 Amp	2004	14	2 Each			
D5010		Circuit Breaker, Main, 208 Y, 120 V, 800 Amp	2004	14	1 Each			
D5010		Disconnect Switch, 100 Amp	2004	34	3 Each			
D5010		Disconnect Switch, 30 Amp	2004	34	1 Each			
D5010		Disconnect Switch, 60 Amp	1988	-1	1 Each	$747	Roof	Rusted
D5010		Disconnect Switch, 600 Amp	2004	34	1 Each			
D5010	LPY	Power Panel Board, 208 Y, 120 V, 100 Amp	1988	-2	1 Each	$3,809		
D5010	UPS Bypass Panelboard	Power Panel Board, 208 Y, 120 V, 400 Amp	2002	12	1 Each			
D5010	UPS1	Power Panel Board, 208 Y, 120 V, 400 Amp	2002	12	1 Each			
D5010	MDPC, MDPE	Power Panel Board, 208 Y, 120 V, 800 Amp	1988	-2	2 Each	$19,119		
D5010	MDPEH Sec 1, Sec 2	Power Panel Board, 480 Y, 277 V, 600 Amp	2004	14	2 Each			
D5010	MDPNH	Power Panel Board, 480 Y, 277 V, 800 Amp	2004	14	1 Each			
D5010	T-2	Secondary Transformer, Dry, 150 kVA	2004	14	1 Each		Site	
D5010	ATS	Transfer Switch, Auto, 600 V, 600 Amp	2004	2	1 Each			
D5010		Transient Voltage Surge Suppression Panel	2004	14	2 Each			
D5010		Transient Voltage Surge Suppression Panel	2011	21	1 Each			
D5020		Emergency Lighting Pack, 2 Light w/ Battery	1988	-12	2 Each	$1,852		
D5020		Fluorescent Lighting Fixture, T12, 40 W	1988	-12	12 Each	$1,872		2 Bulb Fixtures
D5020		Fluorescent Lighting Fixture, T12, 60 W	1988	-12	3 Each	$468		3 Bulb Fixtures, LED Bulbs installed but fixture is old.
D5020		Grounded Fault Circuit Interrupter, 15 Amp	1988	-12	1 Each	$58		
D5020		Incandescent Lighting Fixture, Basic, 100 W	1988	-12	5 Each	$686	Exterior	
D5020		Receptacle, 120 V, 20 Amp	1988	-12	5 Each	$294		
D5020		Wiring Device, Switch	1988	-17	7 Each	$188		
D5030		Fire Alarm Horn & Strobe	2012	12	3 Each			
D5030		Heat Detector	2012	7	1 Each			

Uniformat	Equip ID	Component	Install Year	Remaining Service Life	Quantity	Deferred Maintenance	Location	Note
D5030		Manual Pull Station	2012	7	3 Each			
D5030		Smoke Detector	2012	7	2 Each			
D5030		Smoke Detector, Duct	2012	7	1 Each			
D5090		Battery Charger	2004	4	1 Each			
D5090		Control Panel, Load Bank - JE	2002	-3	1 Each	$2,427		
D5090		Control Panel, Load Bank - JE	2004	-1	1 Each	$2,427		
D5090		Generator Battery, Wet, 1 V	2018	8	2 Each			
D5090		Generator, Diesel, 300 kW	2004	9	1 Each			300 kW / 375 kVa
D5090		Lightning Protection - JE	1988	-7	0.143 KLnFt	$433		
D5090		Load Bank, 200 kW	2002	-1	1 Each	$16,413	Roof	Serves UPS
D5090		Load Bank, 300 KW - JE	2004	-1	1 Each	$10,363	Grade	Serves EG
D5090	UPS	Uninterruptible Power Supply, 100 KW - JE	2002	-3	1 Each	$60,478		100 kVa Output
D5090		UPS Battery - JE	2014	4	30 Each			

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building Name: TUL - EG Building

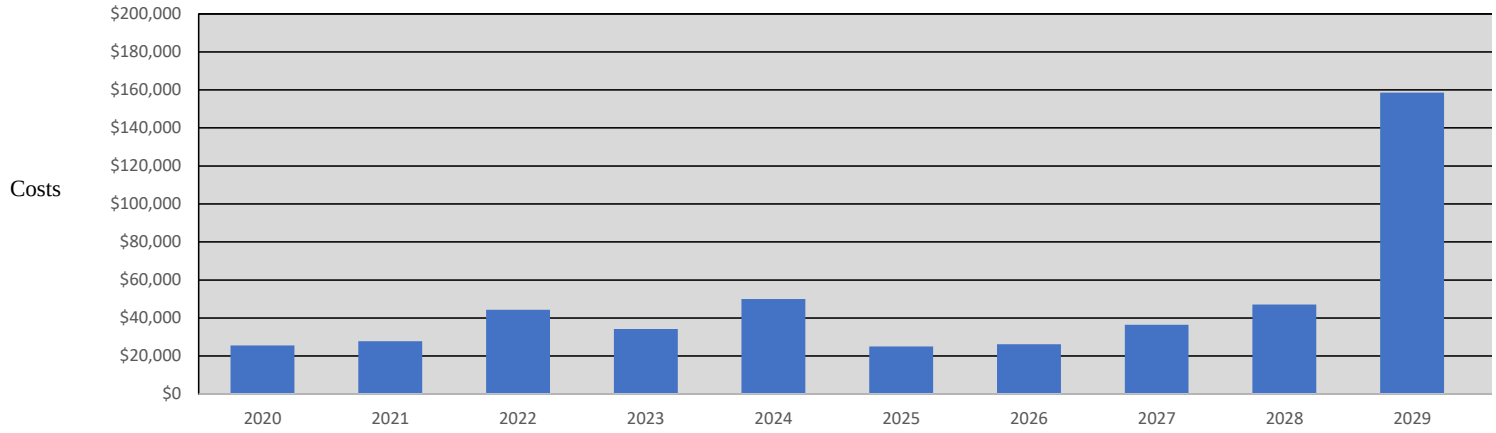
Year Installed	Years Deferred	Deferred Maintenance Tasks	Quantity	UoM	Deferred Maintenance Cost	Equip ID
1988	N/A	TUL - EG Building Duplicates $79,787 - $15,423 (APP E)	1	Each	$64,364	
2002	3	Replace Uninterruptible Power Supply, 100 KW - JE	1	Each	$60,478	UPS
1988	2	Replace Circuit Breaker, 600 V, 400 Amp	7	Each	$29,920	
1988	2	Replace Power Panel Board, 208 Y, 120 V, 800 Amp	2	Each	$19,119	MDPC, MDPE
2002	1	Replace Load Bank, 200 kW	1	Each	$16,413	
2004	1	Replace Load Bank, 300 KW - JE	1	Each	$10,363	
1988	1	Replace Steel, Painted, Exterior Double Door	2	Each	$4,054	
1988	2	Replace Power Panel Board, 208 Y, 120 V, 100 Amp	1	Each	$3,809	LPY
1988	2	Replace Circuit Breaker, 3 Ph., 600 V, 60 Amp	3	Each	$3,608	
1988	2	Replace Circuit Breaker, 3 Ph., 600 V, 100 Amp	2	Each	$2,653	
2002	3	Replace Control Panel, Load Bank - JE	1	Each	$2,427	
2004	1	Replace Control Panel, Load Bank - JE	1	Each	$2,427	
1988	12	Replace Fluorescent Lighting Fixture, T12, 40 W	12	Each	$1,872	
1988	12	Replace Emergency Lighting Pack, 2 Light w/ Battery	2	Each	$1,852	
1988	17	Replace Unit Heater, Electric - JE	2	Each	$1,784	EUH-1, EUH-2
1988	1	Replace Steel, Painted, Exterior Door	1	Each	$896	
1988	7	Replace Pipe & Fittings, 3/4" Copper - JE	0.026	KLnFt	$784	
1988	2	Replace Circuit Breaker, 15/20 Amp. - JE	25	Each	$749	
1988	1	Replace Disconnect Switch, 60 Amp	1	Each	$747	
1988	12	Replace Incandescent Lighting Fixture, Basic, 100 W	5	Each	$686	
1988	12	Replace Fluorescent Lighting Fixture, T12, 60 W	3	Each	$468	
1988	7	Replace Lightning Protection - JE	0.143	KLnFt	$433	
1988	22	Replace Thermostat	2	Each	$427	
1988	12	Replace Receptacle, 120 V, 20 Amp	5	Each	$294	
2004	6	Replace Thermostat	1	Each	$213	
1988	17	Replace Wiring Device, Switch	7	Each	$188	
1988	12	Replace Aluminum Gutter, Downspouts, Fittings	0.024	KLnFt	$112	
1988	7	Replace Pipe Insulation, Fiberglass, Cold Water - JE	0.026	KLnFt	$97	
1988	12	Replace Grounded Fault Circuit Interrupter, 15 Amp	1	Each	$58	
				Total:	**$231,295**	

All costs expressed in ($) 2019

Building: TUL - EG Building **GSFT:** 800

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
B10 Super Structure									$1,102	
B20 Exterior Enclosure				$123					$6,009	
B30 Roofing	$131	$188	$131	$131	$131	$131	$1,227	$131	$231	$131
C10 Interior Construction	$40			$88	$40				$495	
C20 Stairs							$14			
C30 Interior Finishes	$221								$1,655	
D10 Conveying										
D20 Plumbing				$20				$8	$20	
D30 HVAC	$6,099	$8,687	$9,207	$14,873	$6,506	$5,929	$5,929	$15,894	$6,671	$6,318
D40 Fire Protection										
D50 Electrical	$19,030	$18,870	$34,947	$18,947	$43,297	$18,892	$19,030	$20,455	$30,889	$152,178
E10 Equipment										
G20 Site Improvements										
G40 Site Electrical Utilities										
Total $	**$25,521**	**$27,745**	**$44,285**	**$34,182**	**$49,974**	**$24,952**	**$26,200**	**$36,488**	**$47,072**	**$158,627**

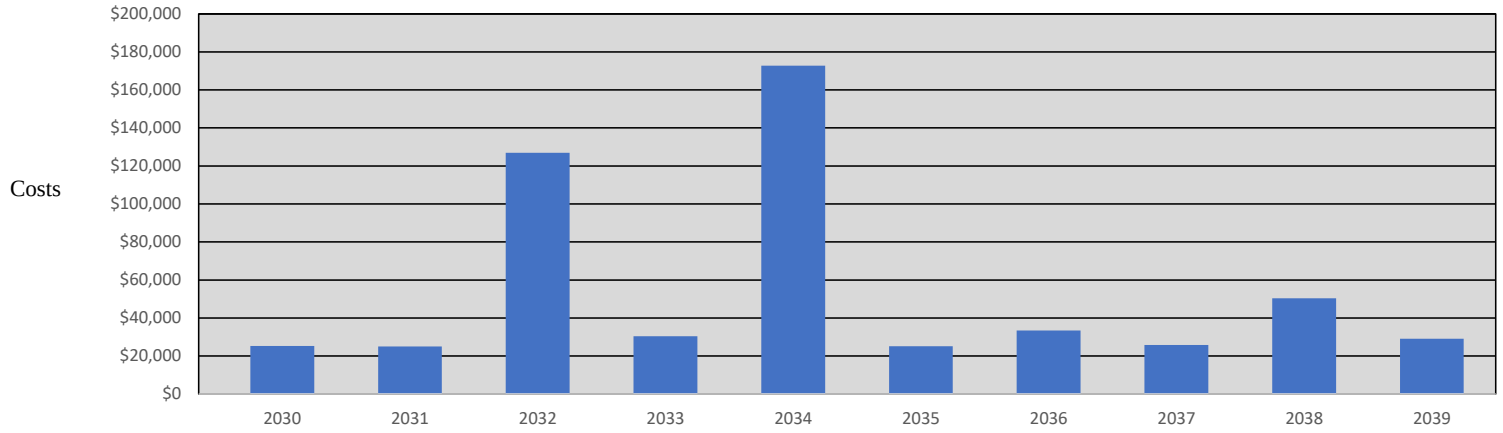


All costs expressed in ($) 2019

Building: TUL - EG Building **GSFT:** 800

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Forcast Year:	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	Total $
B10 Super Structure											**$1,102**
B20 Exterior Enclosure				$990					$9,676		**$16,798**
B30 Roofing	$131	$188	$131	$131	$131	$131	$8,152	$131	$131	$131	**$11,951**
C10 Interior Construction			$40	$88			$40		$455		**$1,286**
C20 Stairs		$20					$14				**$48**
C30 Interior Finishes				$75			$221		$2,986		**$5,158**
D10 Conveying											
D20 Plumbing				$20					$881		**$949**
D30 HVAC	$6,099	$5,929	$5,929	$9,977	$7,646	$6,126	$5,929	$5,929	$9,027	$9,596	**$158,300**
D40 Fire Protection											
D50 Electrical	$19,030	$18,892	$120,842	$19,135	$165,020	$18,870	$19,030	$19,787	$27,259	$19,327	**$823,727**
E10 Equipment											
G20 Site Improvements											
G40 Site Electrical Utilities											
Total $	**$25,260**	**$25,029**	**$126,942**	**$30,416**	**$172,797**	**$25,127**	**$33,386**	**$25,847**	**$50,415**	**$29,054**	**$1,019,319**



All costs expressed in ($) 2019

M&R Cost by Task per Year

JACOBS

Facility: TUL - Tulsa, OK **City:** Tulsa, OK
Building: TUL - EG Building

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
B10 Super Structure															
Repair Steel Roof Access Ladder															
Replace Steel Roof Access Ladder									1,102						
B20 Exterior Enclosure															
Clean & Reseal Clay Brick Clay Brick, Exterior, 1 Story									1,651						
Maintain Door Locks Steel, Painted, Exterior Door				13					13					13	
Maintain Door Locks Steel, Painted, Exterior Double Door				26					26					26	
Refinish Aluminum Louver, 1 Story									90						
Refinish Steel, Painted, Exterior Door									20						
Refinish Steel, Painted, Exterior Double Door									79						
Repair (2% of Walls) Clay Brick, Exterior, 1 Story															
Repair Steel, Painted, Exterior Door														159	
Repair Steel, Painted, Exterior Double Door														708	
Replace Aluminum Louver, 1 Story															
Replace Door Locks Steel, Painted, Exterior Door									192						
Replace Door Locks Steel, Painted, Exterior Double Door									384						
Repoint (50% of Surface) Clay Brick, Exterior, 1 Story															
B30 Roofing															
Maintain Aluminum Gutter, Downspouts, Fittings	5	5	5	5	5	5	5	5		5	5	5	5	5	5
Maintain Single-Ply PVC Membrane Roof - JE	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47
Non-Destructive Moisture Inspection Single-Ply PVC Membrane Roof - JE		57					57					57			
Repair Single-Ply PVC Membrane Roof - JE							1,039								
Replace Aluminum Gutter, Downspouts, Fittings									112						
Replace Flashing - JE															
Replace Single-Ply PVC Membrane Roof - JE															
C10 Interior Construction															
Maintain Door Locks Steel, Painted, Interior Door				26					26					26	
Refinish Steel, Painted, Interior Door	40				40				40				40		
Replace Door Locks Steel, Painted, Interior Door									367						

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - EG Building

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
B10 Super Structure															
Repair Steel Roof Access Ladder									346						
Replace Steel Roof Access Ladder															
B20 Exterior Enclosure															
Clean & Reseal Clay Brick Clay Brick, Exterior, 1 Story				1,651										1,651	
Maintain Door Locks Steel, Painted, Exterior Door				13					13					13	
Maintain Door Locks Steel, Painted, Exterior Double Door				26					26					26	
Refinish Aluminum Louver, 1 Story				90											
Refinish Steel, Painted, Exterior Door				20										20	
Refinish Steel, Painted, Exterior Double Door				79										79	
Repair (2% of Walls) Clay Brick, Exterior, 1 Story				636											
Repair Steel, Painted, Exterior Door														159	
Repair Steel, Painted, Exterior Double Door														708	
Replace Aluminum Louver, 1 Story														1,852	
Replace Door Locks Steel, Painted, Exterior Door				192										192	
Replace Door Locks Steel, Painted, Exterior Double Door				384										384	
Repoint (50% of Surface) Clay Brick, Exterior, 1 Story				3,031											
B30 Roofing															
Maintain Aluminum Gutter, Downspouts, Fittings	5	5	5	5	5	5	5	5	5	5	5	5	5		5
Maintain Single-Ply PVC Membrane Roof - JE	47		47	47	47	47	47	47	47	47	47	47	47	47	47
Non-Destructive Moisture Inspection Single-Ply PVC Membrane Roof - JE							57					57			
Repair Single-Ply PVC Membrane Roof - JE												1,039			
Replace Aluminum Gutter, Downspouts, Fittings														112	
Replace Flashing - JE		308													
Replace Single-Ply PVC Membrane Roof - JE		7,832													
C10 Interior Construction															
Maintain Door Locks Steel, Painted, Interior Door				26					26					26	
Refinish Steel, Painted, Interior Door		40				40				40				40	
Replace Door Locks Steel, Painted, Interior Door				367										367	

All costs expressed in ($) 2019

M&R Cost by Task per Year

JACOBS

Facility: TUL - Tulsa, OK **City:** Tulsa, OK
Building: TUL - EG Building

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
C20 Stairs															
Finish Repaired Metal, Painted, Exterior Railing												0			
Finish Replaced Metal, Painted, Exterior Railing															
Refinish Metal, Painted, Exterior Railing							14								
Repair Metal, Painted, Exterior Railing												20			
Replace Metal, Painted, Exterior Railing															
C30 Interior Finishes															
Finish Repaired Concrete Block, Painted, Interior Wall Finish															
Finish Repaired Concrete, Painted Flooring														7	
Finish Repaired Gypsum Board, Interior Wall Finish									7						
Refinish Concrete Block, Painted, Interior Wall Finish									716						
Refinish Concrete, Painted Flooring									338						
Refinish Gypsum Board, Interior Wall Finish									355						
Repair (2% of Ceiling) Metal Ceiling	221								221						
Repair (2% of Floors) Concrete, Painted Flooring														68	
Repair (2% of Walls) Concrete Block, Painted, Interior Wall Finish															
Repair (2% of Walls) Gypsum Board, Interior Wall Finish									18						
Repoint (50% of Surface) Concrete Block, Painted, Interior Wall Finish															
D20 Plumbing															
Replace 10' Section Pipe & Fittings, 3/4" Copper - JE								8							
Replace Pipe & Fittings, 3/4" Copper - JE															
Replace Pipe Insulation, Fiberglass, Cold Water - JE															
Resolder Joint Pipe & Fittings, 3/4" Copper - JE								0							
Re-tape Pipe Insulation, Fiberglass, Cold Water - JE				6					6					6	
D30 HVAC															
Inspect & Maintain Controller, Fuel Oil Level - JE	12	12	12	12	12	12	12	12	12	12	12	12	12	12	
Maintain Air Conditioner, Rooftop, Single Zone, 7.5 Ton	713	713	713	713	713	713	713		713	713	713	713	713	713	713
Maintain Fuel Tank, 2000 Gal. - JE	233	233	233	233	233	233	233	233	233	233	233	233	233	233	233
Maintain Generator Day Tank, 65 Gal	19	19	19	19	19	19	19	19	19	19	19	19	19	19	

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - EG Building

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
C20 Stairs															
Finish Repaired Metal, Painted, Exterior Railing															
Finish Replaced Metal, Painted, Exterior Railing												14			
Refinish Metal, Painted, Exterior Railing		14													
Repair Metal, Painted, Exterior Railing															
Replace Metal, Painted, Exterior Railing												1,114			
C30 Interior Finishes															
Finish Repaired Concrete Block, Painted, Interior Wall Finish				14											
Finish Repaired Concrete, Painted Flooring														7	
Finish Repaired Gypsum Board, Interior Wall Finish														7	
Refinish Concrete Block, Painted, Interior Wall Finish				716										716	
Refinish Concrete, Painted Flooring				338										338	
Refinish Gypsum Board, Interior Wall Finish				355										355	
Repair (2% of Ceiling) Metal Ceiling		221								221					
Repair (2% of Floors) Concrete, Painted Flooring														68	
Repair (2% of Walls) Concrete Block, Painted, Interior Wall Finish				140											
Repair (2% of Walls) Gypsum Board, Interior Wall Finish														18	
Repoint (50% of Surface) Concrete Block, Painted, Interior Wall Finish				1,423											
D20 Plumbing															
Replace 10' Section Pipe & Fittings, 3/4" Copper - JE															
Replace Pipe & Fittings, 3/4" Copper - JE				784											
Replace Pipe Insulation, Fiberglass, Cold Water - JE				97											
Resolder Joint Pipe & Fittings, 3/4" Copper - JE															
Re-tape Pipe Insulation, Fiberglass, Cold Water - JE									6					6	
D30 HVAC															
Inspect & Maintain Controller, Fuel Oil Level - JE	12	12	12	12	12	12	12	12	12	12	12	12	12	12	
Maintain Air Conditioner, Rooftop, Single Zone, 7.5 Ton	713	713	713	713	713	713	713	713	713		713	713	713	713	713
Maintain Fuel Tank, 2000 Gal. - JE	233	233	233	233	233	233	233	233		233	233	233	233	233	233
Maintain Generator Day Tank, 65 Gal	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - EG Building

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Maintain Thermostat	61	81	81	81	61	81	81	81	40	81	61	81	81	81	61
Maintain Unit Heater, Electric - JE	79	79	79	79	79	79	79	79	79	79	79	79	79		79
Maintain, 12 Month Air Handler, Single Zone, 2,500 Cfm	317	317	317		317	317	317	317	317	317	317	317	317	317	317
Maintain, 12 Month Condenser, Air-Cooled, 7.5 Ton	52		52	52	52	52	52	52	52	52	52	52	52	52	52
Maintain, 3 Month Air Handler, Single Zone, 2,500 Cfm	268	268	268		268	268	268	268	268	268	268	268	268	268	268
Maintain, 3 Month Condenser, Air-Cooled, 7.5 Ton	312		312	312	312	312	312	312	312	312	312	312	312	312	312
Maintain, 6 Month Condenser, Air-Cooled, 7.5 Ton	32		32	32	32	32	32	32	32	32	32	32	32	32	32
Maintain, 6 Month Exhaust Fan, Propeller, 1,000 Cfm	258	258	258		258	258	258	258	258	258	258	258	258	258	258
Maintain, 6 Month Exhaust Fan, Propeller, 375 Cfm	258	258	258	258		258	258	258	258	258	258	258	258	258	258
Minor Repair Controller, Fuel Oil Level - JE					184					184					
Repair Air Conditioner, Rooftop, Single Zone, 7.5 Ton			3,278												
Repair Air Handler, Single Zone, 2,500 Cfm														1,435	
Repair Condenser, Air-Cooled, 7.5 Ton														996	
Repair Exhaust Fan, Propeller, 1,000 Cfm															197
Repair Exhaust Fan, Propeller, 375 Cfm															
Repair Unit Heater, Electric - JE									402						
Replace Air Conditioner, Rooftop, Single Zone, 7.5 Ton								11,488							
Replace Air Handler, Single Zone, 2,500 Cfm				7,647											
Replace Condenser, Air-Cooled, 7.5 Ton		3,844													
Replace Controller, Fuel Oil Level - JE															800
Replace Duct Insulation, Fiberglass - JE				655											
Replace Ductwork - JE				1,511											
Replace Exhaust Fan, Propeller, 1,000 Cfm				1,021											
Replace Exhaust Fan, Propeller, 375 Cfm					549										
Replace Fuel Tank, 2000 Gal. - JE															
Replace Generator Day Tank, 65 Gal															616
Replace Thermostat	213				213				427		213				213
Replace Unit Heater, Electric - JE														1,784	

D50 Electrical

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - EG Building

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Maintain Thermostat	81	81	81	40	81	61	81	81	81	61	81	81	81	40	81
Maintain Unit Heater, Electric - JE	79	79	79	79	79	79	79	79	79	79	79	79	79		79
Maintain, 12 Month Air Handler, Single Zone, 2,500 Cfm	317	317	317	317	317	317	317		317	317	317	317	317	317	317
Maintain, 12 Month Condenser, Air-Cooled, 7.5 Ton	52	52	52		52	52	52	52	52	52	52	52	52	52	52
Maintain, 3 Month Air Handler, Single Zone, 2,500 Cfm	268	268	268	268	268	268	268		268	268	268	268	268	268	268
Maintain, 3 Month Condenser, Air-Cooled, 7.5 Ton	312	312	312		312	312	312	312	312	312	312	312	312	312	312
Maintain, 6 Month Condenser, Air-Cooled, 7.5 Ton	32	32	32		32	32	32	32	32	32	32	32	32	32	32
Maintain, 6 Month Exhaust Fan, Propeller, 1,000 Cfm	258	258	258	258	258	258	258		258	258	258	258	258	258	258
Maintain, 6 Month Exhaust Fan, Propeller, 375 Cfm	258	258	258	258	258	258	258	258		258	258	258	258	258	258
Minor Repair Controller, Fuel Oil Level - JE					184					184					
Repair Air Conditioner, Rooftop, Single Zone, 7.5 Ton					3,278										
Repair Air Handler, Single Zone, 2,500 Cfm															
Repair Condenser, Air-Cooled, 7.5 Ton															
Repair Exhaust Fan, Propeller, 1,000 Cfm															
Repair Exhaust Fan, Propeller, 375 Cfm	197														
Repair Unit Heater, Electric - JE															
Replace Air Conditioner, Rooftop, Single Zone, 7.5 Ton										11,488					
Replace Air Handler, Single Zone, 2,500 Cfm								7,647							
Replace Condenser, Air-Cooled, 7.5 Ton				3,844											
Replace Controller, Fuel Oil Level - JE															800
Replace Duct Insulation, Fiberglass - JE															
Replace Ductwork - JE															
Replace Exhaust Fan, Propeller, 1,000 Cfm								1,021							
Replace Exhaust Fan, Propeller, 375 Cfm									549						
Replace Fuel Tank, 2000 Gal. - JE									10,137						
Replace Generator Day Tank, 65 Gal															
Replace Thermostat				427		213				213				427	
Replace Unit Heater, Electric - JE														1,784	

D50 Electrical

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - EG Building

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Annual PM Circuit Breaker, 15/20 Amp. - JE	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Annual PM Uninterruptible Power Supply, 100 KW - JE	1,593	1,593	1,593	1,593	1,593	1,593	1,593	1,593	1,593	1,593	1,593	1,593		1,593	1,593
Annual PM UPS Battery - JE	1,771	1,771	1,771	1,771		1,771	1,771	1,771	1,771	1,771	1,771	1,771	1,771	1,771	
Check & Adjust Manual Pull Station			125												
Check Operation Smoke Detector, Duct	15	15	15	15	15	15	15		15	15	15	15	15	15	15
Clean Terminals, Check Water & Test Generator Battery, Wet, 1 V	39	39	39	39	39	39	39	39		39	39	39	39	39	39
Electrical Testing Generator, Diesel, 300 kW	468	468	468	468	468	468	468	468	468		468	468	468	468	468
Inspect & Clean Transfer Switch, Auto, 600 V, 600 Amp	468	468		468	468	468	468	468	468	468	468	468	468	468	468
Inspect & Maintain Control Panel, Load Bank - JE	98	98	98	98	98	98	98	98	98	98	98	98	49	98	49
Maintain & Repair General Wiring Lightning Protection - JE	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Maintain Circuit Breaker, 3 Ph., 600 V, 100 Amp	237	237	237	237	237	237	237	237	237	237	237	237	178	237	118
Maintain Circuit Breaker, 3 Ph., 600 V, 60 Amp	148	148	148	148	148	148	148	148	148	148	148	148	148	148	89
Maintain Circuit Breaker, 600 V, 400 Amp	680	680	680	680	680	680	680	680	680	680	680	680	503	680	384
Maintain Circuit Breaker, Main, 208 Y, 120 V, 600 Amp	59	59	59	59	59	59	59	59	59	59	59	59	59	59	
Maintain Circuit Breaker, Main, 208 Y, 120 V, 800 Amp	30	30	30	30	30	30	30	30	30	30	30	30	30	30	
Maintain Disconnect Switch, 100 Amp	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206
Maintain Disconnect Switch, 30 Amp	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69
Maintain Disconnect Switch, 60 Amp	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69
Maintain Disconnect Switch, 600 Amp	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69
Maintain Load Bank, 300 KW - JE	30	30	30	30	30	30	30	30	30	30	30	30	30	30	
Maintain Power Panel Board, 208 Y, 120 V, 100 Amp	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69
Maintain Power Panel Board, 208 Y, 120 V, 400 Amp	138	138	138	138	138	138	138	138	138	138	138	138		138	138
Maintain Power Panel Board, 208 Y, 120 V, 800 Amp	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78
Maintain Power Panel Board, 480 Y, 277 V, 600 Amp	78	78	78	78	78	78	78	78	78	78	78	78	78	78	
Maintain Power Panel Board, 480 Y, 277 V, 800 Amp	39	39	39	39	39	39	39	39	39	39	39	39	39	39	
Maintain Secondary Transformer, Dry, 150 kVA	78	78	78	78	78	78	78	78	78	78	78	78	78	78	
Maintain Transient Voltage Surge Suppression Panel	78	78	78	78	78	78	78	78	78	78	78	78	78	78	26
Maintain, 1 Month Generator, Diesel, 300 kW	708	708	708	708	708	708	708	708	708		708	708	708	708	708
Maintain, 12 Month Generator, Diesel, 300 kW	6	6	6	6	6	6	6	6	6		6	6	6	6	6

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - EG Building

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Annual PM Circuit Breaker, 15/20 Amp. - JE	7	7	7	7	7	7	7	7	7	7	7	7	7		7
Annual PM Uninterruptible Power Supply, 100 KW - JE	1,593	1,593	1,593	1,593	1,593	1,593	1,593	1,593	1,593	1,593	1,593	1,593		1,593	1,593
Annual PM UPS Battery - JE	1,771	1,771	1,771	1,771	1,771	1,771	1,771	1,771	1,771		1,771	1,771	1,771	1,771	1,771
Check & Adjust Manual Pull Station			125												
Check Operation Smoke Detector, Duct	15	15	15	15	15	15	15		15	15	15	15	15	15	15
Clean Terminals, Check Water & Test Generator Battery, Wet, 1 V	39	39	39		39	39	39	39	39	39	39	39	39		39
Electrical Testing Generator, Diesel, 300 kW	468	468	468	468	468	468	468	468	468	468	468	468	468	468	468
Inspect & Clean Transfer Switch, Auto, 600 V, 600 Amp	468	468	468	468	468		468	468	468	468	468	468	468	468	468
Inspect & Maintain Control Panel, Load Bank - JE	98	98	98	98	98	98	98	98	98	98	98	98	49	98	49
Maintain & Repair General Wiring Lightning Protection - JE	10	10	10		10	10	10	10	10	10	10	10	10	10	10
Maintain Circuit Breaker, 3 Ph., 600 V, 100 Amp	237	237	237	237	237	237	237	237	237	237	237	237	237	237	237
Maintain Circuit Breaker, 3 Ph., 600 V, 60 Amp	148	148	148	148	148	148	148	148	148	148	148	148	148	148	148
Maintain Circuit Breaker, 600 V, 400 Amp	680	680	680	680	680	680	680	680	680	680	680	680	680	680	680
Maintain Circuit Breaker, Main, 208 Y, 120 V, 600 Amp	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59
Maintain Circuit Breaker, Main, 208 Y, 120 V, 800 Amp	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Maintain Disconnect Switch, 100 Amp	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206
Maintain Disconnect Switch, 30 Amp	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69
Maintain Disconnect Switch, 60 Amp	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69
Maintain Disconnect Switch, 600 Amp	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69
Maintain Load Bank, 300 KW - JE	30	30	30	30	30	30	30	30	30	30	30	30	30	30	
Maintain Power Panel Board, 208 Y, 120 V, 100 Amp	69	69	69	69	69	69	69	69	69	69	69	69	69		69
Maintain Power Panel Board, 208 Y, 120 V, 400 Amp	138	138	138	138	138	138	138	138	138	138	138	138	138	138	138
Maintain Power Panel Board, 208 Y, 120 V, 800 Amp	78	78	78	78	78	78	78	78	78	78	78	78	78		78
Maintain Power Panel Board, 480 Y, 277 V, 600 Amp	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78
Maintain Power Panel Board, 480 Y, 277 V, 800 Amp	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39
Maintain Secondary Transformer, Dry, 150 kVA	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78
Maintain Transient Voltage Surge Suppression Panel	78	78	78	78	78	78	52	78	78	78	78	78	78	78	78
Maintain, 1 Month Generator, Diesel, 300 kW	708	708	708	708	708	708	708	708	708	708	708	708	708	708	708
Maintain, 12 Month Generator, Diesel, 300 kW	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - EG Building

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Maintain, 12 Month Heat Detector	20	20	20	20	20	20	20		20	20	20	20	20	20	20
Maintain, 12 Month Power Panel Board, 208 Y, 120 V, 800 Amp	163	163	163	163	163	163	163	163	163	163	163	163	163	163	163
Maintain, 12 Month Power Panel Board, 480 Y, 277 V, 600 Amp	163	163	163	163	163	163	163	163	163	163	163	163	163	163	
Maintain, 12 Month Power Panel Board, 480 Y, 277 V, 800 Amp	82	82	82	82	82	82	82	82	82	82	82	82	82	82	
Maintain, 12 Month Secondary Transformer, Dry, 150 kVA	78	78	78	78	78	78	78	78	78	78	78	78	78	78	
Maintain, 12 Month Transfer Switch, Auto, 600 V, 600 Amp	166	166		166	166	166	166	166	166	166	166	166	166	166	166
Maintain, 36 Month Secondary Transformer, Dry, 150 kVA			22			22			22			22			
Maintain, 6 Month Generator, Diesel, 300 kW	336	336	336	336	336	336	336	336	336		336	336	336	336	336
Maintain, 6 Month Load Bank, 200 kW	194	194	194	194	194	194	194	194	194	194	194	194	194	194	194
Minor Repair Control Panel, Load Bank - JE			200		200			200		200					
Repair Battery Charger	160		160				160		160		160		160		160
Repair Circuit Breaker, 15/20 Amp. - JE									195						
Repair Circuit Breaker, 3 Ph., 600 V, 100 Amp			881		1,763				881						
Repair Circuit Breaker, 3 Ph., 600 V, 60 Amp					881				1,322						
Repair Circuit Breaker, 600 V, 400 Amp			2,644		4,407				3,085						
Repair Circuit Breaker, Main, 208 Y, 120 V, 600 Amp					1,068										
Repair Circuit Breaker, Main, 208 Y, 120 V, 800 Amp					534										
Repair Disconnect Switch, 100 Amp					301										301
Repair Disconnect Switch, 30 Amp					82										82
Repair Disconnect Switch, 60 Amp									86						
Repair Disconnect Switch, 600 Amp					184										184
Repair Heat Detector			32												
Repair Power Panel Board, 208 Y, 120 V, 100 Amp									68						
Repair Power Panel Board, 208 Y, 120 V, 400 Amp			136												
Repair Power Panel Board, 208 Y, 120 V, 800 Amp									137						
Repair Power Panel Board, 480 Y, 277 V, 600 Amp					206										
Repair Power Panel Board, 480 Y, 277 V, 800 Amp					103										
Repair Secondary Transformer, Dry, 150 kVA					319										
Repair Smoke Detector			59												

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - EG Building

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Maintain, 12 Month Heat Detector	20	20	20	20	20	20	20		20	20	20	20	20	20	20
Maintain, 12 Month Power Panel Board, 208 Y, 120 V, 800 Amp	163	163	163	163	163	163	163	163	163	163	163	163	163		163
Maintain, 12 Month Power Panel Board, 480 Y, 277 V, 600 Amp	163	163	163	163	163	163	163	163	163	163	163	163	163	163	163
Maintain, 12 Month Power Panel Board, 480 Y, 277 V, 800 Amp	82	82	82	82	82	82	82	82	82	82	82	82	82	82	82
Maintain, 12 Month Secondary Transformer, Dry, 150 kVA	78	78	78	78	78	78	78	78	78	78	78	78	78	78	78
Maintain, 12 Month Transfer Switch, Auto, 600 V, 600 Amp	166	166	166	166	166		166	166	166	166	166	166	166	166	166
Maintain, 36 Month Secondary Transformer, Dry, 150 kVA			22			22			22			22			22
Maintain, 6 Month Generator, Diesel, 300 kW	336	336	336	336	336	336	336	336	336	336	336	336	336	336	336
Maintain, 6 Month Load Bank, 200 kW	194	194	194	194	194	194	194	194	194		194	194	194	194	194
Minor Repair Control Panel, Load Bank - JE			200		200			200		200					
Repair Battery Charger		160		160		160		160				160		160	
Repair Circuit Breaker, 15/20 Amp. - JE				195											
Repair Circuit Breaker, 3 Ph., 600 V, 100 Amp				881				881		1,763				881	
Repair Circuit Breaker, 3 Ph., 600 V, 60 Amp				1,322						881				1,322	
Repair Circuit Breaker, 600 V, 400 Amp				3,085				2,644		4,407				3,085	
Repair Circuit Breaker, Main, 208 Y, 120 V, 600 Amp										1,068					
Repair Circuit Breaker, Main, 208 Y, 120 V, 800 Amp										534					
Repair Disconnect Switch, 100 Amp										301					
Repair Disconnect Switch, 30 Amp										82					
Repair Disconnect Switch, 60 Amp				86										86	
Repair Disconnect Switch, 600 Amp										184					
Repair Heat Detector			32												
Repair Power Panel Board, 208 Y, 120 V, 100 Amp				68											
Repair Power Panel Board, 208 Y, 120 V, 400 Amp								136							
Repair Power Panel Board, 208 Y, 120 V, 800 Amp				137											
Repair Power Panel Board, 480 Y, 277 V, 600 Amp										206					
Repair Power Panel Board, 480 Y, 277 V, 800 Amp										103					
Repair Secondary Transformer, Dry, 150 kVA										319					
Repair Smoke Detector			59												

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - EG Building

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Repair Smoke Detector, Duct			29												
Repair Transfer Switch, Auto, 600 V, 600 Amp								193					193		
Repair Wiring Device, Switch									166						
Replace Ballast & Lamps Fluorescent Lighting Fixture, T12, 40 W															
Replace Ballast & Lamps Fluorescent Lighting Fixture, T12, 60 W															
Replace Batteries & Check Operation Smoke Detector	26	26	26	26	26	26	26		26	26	26	26	26	26	26
Replace Battery Charger					1,209										
Replace Circuit Breaker, 15/20 Amp. - JE															
Replace Circuit Breaker, 3 Ph., 600 V, 100 Amp													2,653		5,307
Replace Circuit Breaker, 3 Ph., 600 V, 60 Amp															2,406
Replace Circuit Breaker, 600 V, 400 Amp													25,645		42,742
Replace Circuit Breaker, Main, 208 Y, 120 V, 600 Amp															18,721
Replace Circuit Breaker, Main, 208 Y, 120 V, 800 Amp															9,882
Replace Control Panel, Load Bank - JE													2,427		2,427
Replace Elements Load Bank, 300 KW - JE					336										
Replace Emergency Lighting Pack, 2 Light w/ Battery									1,852						
Replace Fire Alarm Horn & Strobe													440		
Replace Fluorescent Lighting Fixture, T12, 40 W									1,872						
Replace Fluorescent Lighting Fixture, T12, 60 W									468						
Replace Generator Battery, Wet, 1 V									947						
Replace Generator, Diesel, 300 kW										135,975					
Replace Grounded Fault Circuit Interrupter, 15 Amp									58						
Replace Heat Detector								121							
Replace Incandescent Lighting Fixture, Basic, 100 W									686						
Replace Lamp Emergency Lighting Pack, 2 Light w/ Battery	78	78	78	78	78	78	78	78		78	78	78	78	78	78
Replace Lamp Incandescent Lighting Fixture, Basic, 100 W				34										34	
Replace Lens Emergency Lighting Pack, 2 Light w/ Battery															
Replace Lightning Protection - JE															
Replace Load Bank, 200 kW															

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - EG Building

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Repair Smoke Detector, Duct			29												
Repair Transfer Switch, Auto, 600 V, 600 Amp			193								193				
Repair Wiring Device, Switch									166						
Replace Ballast & Lamps Fluorescent Lighting Fixture, T12, 40 W				840											
Replace Ballast & Lamps Fluorescent Lighting Fixture, T12, 60 W				224											
Replace Batteries & Check Operation Smoke Detector	26	26	26	26	26	26	26		26	26	26	26	26	26	26
Replace Battery Charger										1,209					
Replace Circuit Breaker, 15/20 Amp. - JE														749	
Replace Circuit Breaker, 3 Ph., 600 V, 100 Amp															
Replace Circuit Breaker, 3 Ph., 600 V, 60 Amp															
Replace Circuit Breaker, 600 V, 400 Amp															
Replace Circuit Breaker, Main, 208 Y, 120 V, 600 Amp															
Replace Circuit Breaker, Main, 208 Y, 120 V, 800 Amp															
Replace Control Panel, Load Bank - JE													2,427		2,427
Replace Elements Load Bank, 300 KW - JE										336					
Replace Emergency Lighting Pack, 2 Light w/ Battery														1,852	
Replace Fire Alarm Horn & Strobe															
Replace Fluorescent Lighting Fixture, T12, 40 W														1,872	
Replace Fluorescent Lighting Fixture, T12, 60 W														468	
Replace Generator Battery, Wet, 1 V				947										947	
Replace Generator, Diesel, 300 kW															
Replace Grounded Fault Circuit Interrupter, 15 Amp														58	
Replace Heat Detector								121							
Replace Incandescent Lighting Fixture, Basic, 100 W														686	
Replace Lamp Emergency Lighting Pack, 2 Light w/ Battery	78	78	78	78	78	78	78	78	78	78	78	78	78		78
Replace Lamp Incandescent Lighting Fixture, Basic, 100 W				34					34						
Replace Lens Emergency Lighting Pack, 2 Light w/ Battery				46											
Replace Lightning Protection - JE				433											
Replace Load Bank, 200 kW										16,413					

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - EG Building

Forcast Year:	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Replace Load Bank, 300 KW - JE															10,363
Replace Manual Pull Station								280							
Replace Power Panel Board, 208 Y, 120 V, 100 Amp															
Replace Power Panel Board, 208 Y, 120 V, 400 Amp													14,588		
Replace Power Panel Board, 208 Y, 120 V, 800 Amp															
Replace Power Panel Board, 480 Y, 277 V, 600 Amp															19,421
Replace Power Panel Board, 480 Y, 277 V, 800 Amp															11,017
Replace Receptacle, 120 V, 20 Amp									294						
Replace Secondary Transformer, Dry, 150 kVA															11,859
Replace Smoke Detector								253							
Replace Smoke Detector, Duct								421							
Replace Transfer Switch, Auto, 600 V, 600 Amp			12,920												
Replace Transient Voltage Surge Suppression Panel															1,205
Replace Uninterruptible Power Supply, 100 KW - JE													60,478		
Replace UPS Battery - JE					16,630										16,630
Replace Wiring Device, Switch														188	

All costs expressed in ($) 2019

Facility: TUL - Tulsa, OK **City:** Tulsa, OK

Building: TUL - EG Building

Forcast Year:	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
Replace Load Bank, 300 KW - JE															10,363
Replace Manual Pull Station								280							
Replace Power Panel Board, 208 Y, 120 V, 100 Amp														3,809	
Replace Power Panel Board, 208 Y, 120 V, 400 Amp															
Replace Power Panel Board, 208 Y, 120 V, 800 Amp														19,119	
Replace Power Panel Board, 480 Y, 277 V, 600 Amp															
Replace Power Panel Board, 480 Y, 277 V, 800 Amp															
Replace Receptacle, 120 V, 20 Amp														294	
Replace Secondary Transformer, Dry, 150 kVA															
Replace Smoke Detector								253							
Replace Smoke Detector, Duct								421							
Replace Transfer Switch, Auto, 600 V, 600 Amp						12,920									
Replace Transient Voltage Surge Suppression Panel							603								
Replace Uninterruptible Power Supply, 100 KW - JE													60,478		
Replace UPS Battery - JE										16,630					
Replace Wiring Device, Switch														188	

All costs expressed in ($) 2019

APPENDIX A: SITE PHOTOGRAPHS



TUL ATCT and Base Building

Tulsa, Oklahoma

CHS – ATCT

Cab & Catwalk Roofing





The Cab roof has many areas of ponding water. The painted on elastomeric coating that was installed over an old roofing system is bubbled, cracked and peeling up at few locations allowing water to get between the elastomeric coating and the roofing under the elastomeric coating.

CHS – ATCT

Cab Glass



The 12 Cab windows are original and beyond their expected service lives. The windows are single pane, non-insulating glass. Additionally, on site personnel noted that the Cab windows frequently have condensation on the exterior of the windows requiring Airport personnel to squeegee the windows for controller visibility.

TUL – ATCT

Elevator





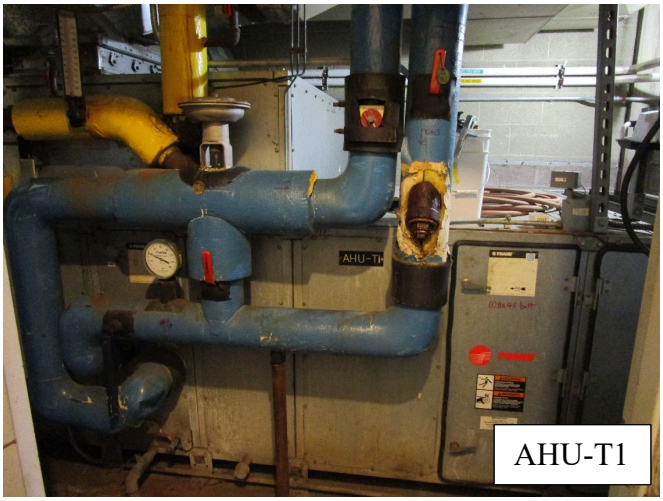
The elevator in the ATCT is original 1958 construction.

TUL – Facility

Air Handlers









Majority of the Air handlers in the facility have reached the end of their expected service lives.

TUL – Facility

Power Panels



Hall PP



P7



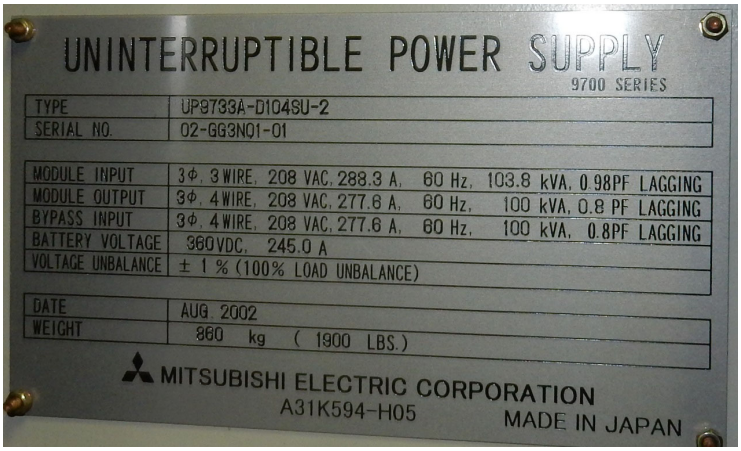
PP8

Majority of the panelboards in the facility are old and obsolete. Some panelboards date back to the original 1958 construction.

TUL – E/G Building

Uninterruptible Power Supply





The uninterruptible power supply has reached the end of it expected service life.

TUL – Site

Parking Lot







The parking lot asphalt pavement is cracked and starting to deteriorate at many locations.

APPENDIX B: GLOSSARY OF TERMS

Building – Each facility is made up of one or more buildings. Each building is described by key features such as size and replacement costs, and in terms of its component inventory.

Building Maintenance and Repair (M&R) – The collection of activities necessary to keep a building in good working order. Included in this definition are regularly scheduled adjustments and inspections, preventive maintenance tasks, service calls for minor repairs, and the periodic major repair or replacement of building components. Other tasks associated with facilities operation such as custodial services, landscaping, waste disposals, and the provision of central utilities are not included.

Calculation Methodology (Life Cycle)

Gross Square Footage - The square footage reported in the narrative and the PRV sheet, including the Cab, is gross square footage. Gross square footage is the total area from the outside face to outside face at the specific level. It is calculated using onsite verified drawings, if available, and/or onsite measurements.

Net Square Footage - Using gross square footage for the total interior finishes is not the most accurate measurement for the replacement cost. Therefore, for the Life Cycle models, interior finishes are calculated using net square footage. Net square footage is measured from wall to wall or ceiling to floor. Net square footage does not include voids, shafts, or inside wall partitions. It should be noted that the life cycle estimates are program level estimates. Accordingly, field measurements are accurate to support that level of detail.

Age of Mechanical Equipment - The age of a specific piece of mechanical equipment is determined using one or more of multiple inputs including: site personnel interviews, document research, professional experience, and/or equipment name plate data (serial number). The age may also adjust to reflect actual condition.

Age of Electrical Systems - The age of electrical panels is determined from site personnel interviews, document research, professional experience and/or panel type.

Build Date – Year building construction was completed**.**

Component – A major architectural feature (surfaces and doors and windows) or piece of fixed equipment. Components are described in terms of quantity and major repair and replacement tasks.

Condition Index – Defined as the percentage of the repair deferred maintenance to current replacement value, this index is used in facility and building reports as a measure of relative building condition. Survey results suggest the following subjective scale:

Index Range	Condition
95 – 100%	Good
90 – 95%	Fair
Less than 90%	Corrective Action Needed

Source: Managing the Facilities Portfolio, National Association of College and University Business Officers. Washington, DC, 1991

Deferred Maintenance – The cost of major repair and replacement tasks not performed according to their prescribed life cycle frequency. In CostLab computations, deferred maintenance does not double count tasks that have missed their frequency more the once, and completion of a replacement task removes any deferred maintenance for a given component.

Degradation Cost – The additional cost of deferring maintenance (penalty cost).

Facility – An organization of buildings, such as a university campus, shopping center, or military base located in a city.

Gross Square Feet (gsft) – Area within the building perimeter or "footprint", not including landscaping or parking.

Last Replaced (Date) – The date when a component was either installed new, or restored to new condition. This value is used in resetting component life cycles and computing the deferred maintenance shown on a number of reports. A blank value implies that the original date of construction, Build Date, is the starting point for the deferred maintenance calculation. Also known as Replacement Date.

Net Asset Value – Calculated as the current replacement value of a facility or building minus any major deferred maintenance.

Original Cost – Original Cost of building construction expressed in actual (nominal) dollars.

Preventive Maintenance and Unscheduled Maintenance Costs – Sum labor, material and rental equipment costs associated with preventive maintenance and unscheduled maintenance tasks. The labor rate used in estimating costs depends on whether contract or in-house staff are used. Under contract, the labor rate would include a contract labor rate and contract overhead, and material costs would include a material cost overhead rate. Accomplished by the facility staff, the labor rate would be the respective shop rate and material overhead would not apply.

Preventive Maintenance and Unscheduled Cost = Quantity x [(Hours x Labor Rate x Unscheduled Multiplier) + (Material x Material Overhead) + (Rental Equipment Hours x Rental Equipment Rate)]

Renewal and Replacement Costs – Sum of labor, material, and rental equipment costs associated with a renewal and replacement task. The labor rate used in estimating costs depends on whether contract or in-house staff is used. Under contract, the labor rate would include a contract labor rate and contract labor overhead and material costs would include a material cost overhead rate. Done by the facility staff, the labor rate would be the respective shop rate and material overhead would not apply.

Renewal and Replacement Cost = Quantity x [(Hours x Labor Rate) + (Material x Material Overhead) + (Rental Equipment Hours x Rental Equipment Rate)]

UNIFORMAT – A classification system of building components and systems defined by the American Society of Testing and Material. The UNIFORMAT II classification is based on building systems such as Exterior Closure, Roofing, Interior Finishes, HVAC, Fire Protection, Electrical and Equipment.

Unscheduled Maintenance Tasks – Accounts for service calls, minor adjustments and emergency repairs not performed on a scheduled basis. The tasks were generated by using multipliers that are applied to the labor hours of preventive maintenance (PM) tasks and a ratio of labor to material costs that was derived from CBRE|Buisness Analytics modeling analysis. The following CostLab standard multipliers were used for the Tulsa, Oklahoma Facility:

UNIFORMAT Building System	Multiplier	UNIFORMAT Building System	Multiplier
Superstructure	1.00	Plumbing Systems	2.67
Exterior Closure	2.52	HVAC Systems	1.78
Roofing	2.07	Fire Protection Systems	1.32
Interior Construction	2.70	Electrical Systems	1.90
Stairways	2.22	Equipment	1.99
Interior Finishes	1.67	Site Improvements	1.00
Conveying	1.27	Other Site Construction	2.60*

* This unscheduled maintenance multiplier is applied to trailer facilities. It was adjusted to show the aggregate maintenance cost of all system involved.

APPENDIX C: SUMMARY OF STANDARD REPORTS

From the Life Cycle Condition Assessment that was conducted at the Tulsa, Oklahoma (TUL) Air Traffic Control Tower (ATCT) and Base Building with a Terminal Radar Control (TRACON), the following reports were generated and a description for each report is as follows[1]:

Facility Summary – provides a brief overview of current facility conditions; its size, average age, repairs deferred maintenance, condition index and the net asset value of the facility.

Facility Average M&R Costs – provides an estimate of current facility Maintenance and Repair (M&R) requirements and future requirement forecasts for 5, 20 and 50 years. Costs are expressed in terms of square feet and replacement value.

Facility Most Costly M&R Tasks – provides the 30 most expensive tasks over the next 50 years; expressed in terms of square feet and as a percentage of total costs excluding unscheduled maintenance.

Facility Yearly M&R Cost Profile Chart – graph of the facility cost trend over the next 50 years.

Facility Building List – list basic data for each building comprising the CostLab model for this location.

Building Extended Component List with Remaining Service Life – provides basic building descriptors and an individual breakdown of the components in the ATCT and associated support buildings considered for this life cycle analysis.

Facility Deferred Maintenance Detail – provides an itemized list by task for components to be replaced.

Facility M&R Deferred Maintenance by System Chart – displays deferred maintenance on a bar graph by UNIFORMAT II system.

Facility M&R Cost by System per Year Chart – displays in tabular format and on a bar graph M&R cost by UNIFORMAT system for each of the next 20 years.

M&R Cost by Task per Year – provides a list of every required task over 50 years; described as a task by task annual cost forecast.

The Life Cycle Model also generates additional Detail and Audit reports that because of their volume are not included in this report.

[1] As described in Section 3.1.5 of the main report, Tab 1 also includes the *Facility Plant Replacement Value (PRV) Worksheet* which is not a standard CostLab report.

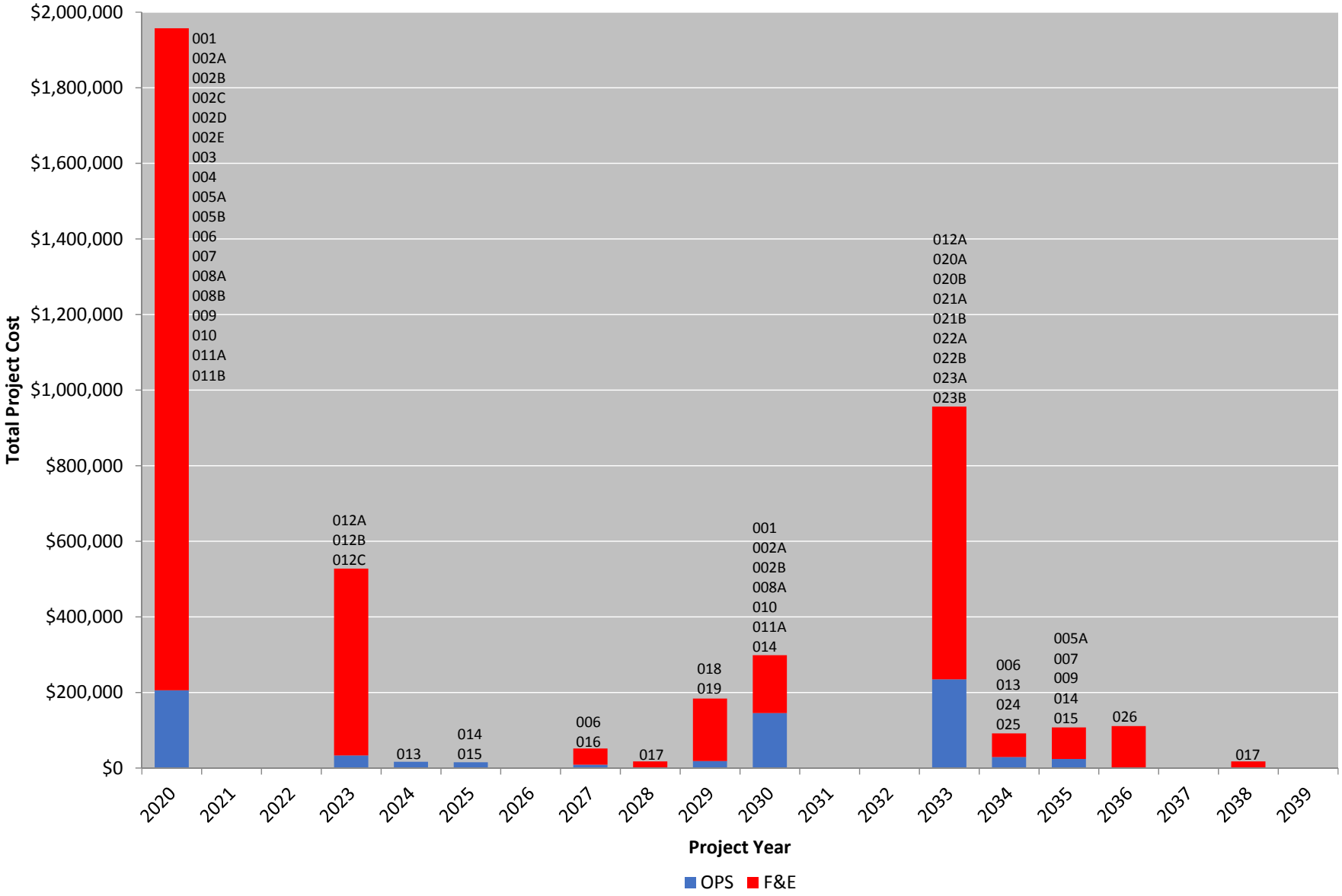
APPENDIX D: FORECASTED SUSTAINMENT PROJECTS

Project List Report

JACOBS

Project Name	Project Number	Project Type	Completion Year	Fund Type	Frequency	Estimate Cost
Security Upgrade	001-TUL	Sustainment/Deferred	2020	F&E	10	$45,564
Refinish-Repair Interior & Exterior	002A-TUL	Sustainment	2020	OPS	10	$48,181
Replace Carpet	002B-TUL	Deferred Maintenance	2020	F&E	10	$9,982
Replace Interior & Exterior	002C-TUL	Sustainment/Deferred	2020	F&E	One Time	$214,598
Repair Interior & Exterior	002D-TUL	Sustainment	2020	OPS	One Time	$44,624
Replace Cab Glass and Windows	002E-TUL	Sustainment/Deferred	2020	F&E	One Time	$269,854
Replace Roofing	003-TUL	Deferred Maintenance	2020	F&E	One Time	$330,058
Renovate Elevator	004-TUL	Deferred Maintenance	2020	F&E	One Time	$123,125
Replace Plumbing	005A-TUL	Sustainment/Deferred	2020	OPS	15	$8,568
Replace Plumbing	005B-TUL	Sustainment/Deferred	2020	F&E	One Time	$19,621
Repair HVAC	006-TUL	Sustainment	2020	OPS	7	$8,829
Replace Stair Pressurization Fan	007-TUL	Sustainment/Deferred	2020	F&E	15	$4,304
Repair Electrical Systems	008A-TUL	Sustainment	2020	OPS	10	$40,943
Replace Electrical Systems	008B-TUL	Sustainment/Deferred	2020	F&E	One Time	$519,759
Replace Uninterruptible Power Supply	009-TUL	Sustainment/Deferred	2020	F&E	15	$79,318
Replace Appliances and Equipment	010-TUL	Sustainment/Deferred	2020	OPS	10	$54,675
Site Improvements	011A-TUL	Sustainment/Deferred	2020	F&E	10	$97,694
Site Improvements	011B-TUL	Sustainment/Deferred	2020	F&E	One Time	$37,616
Replace HVAC Controls	012A-TUL	Sustainment/Deferred	2023	F&E	10	$30,893
Replace HVAC	012B-TUL	Sustainment/Deferred	2023	F&E	One Time	$463,404
Repair HVAC	012C-TUL	Sustainment	2023	OPS	One Time	$33,330
Replace UPS Batteries	013-TUL	Sustainment	2024	OPS	10	$16,630
Repair Electrical Systems	014-TUL	Sustainment	2025	OPS	5	$1,495
Site Improvements	015-TUL	Sustainment	2025	OPS	10	$13,830
Fire & Life Safety Upgrade	016-TUL	Sustainment	2027	F&E	One Time	$42,796
Replace Cab Glass Shades	017-TUL	Sustainment	2028	F&E	10	$17,386
Repair Roofing	018-TUL	Sustainment	2029	OPS	One Time	$18,363
EG Upgrade	019-TUL	Sustainment	2029	F&E	One Time	$165,257
Replace Interior & Exterior	020A-TUL	Sustainment	2033	F&E	One Time	$169,172
Refinish-Repair Interior & Exterior	020B-TUL	Sustainment	2033	OPS	One Time	$27,259
Replace Plumbing	021A-TUL	Sustainment	2033	F&E	One Time	$13,723
Replace Plumbing	021B-TUL	Sustainment	2033	OPS	One Time	$4,788
Repair HVAC	022A-TUL	Sustainment	2033	OPS	One Time	$112,616
Replace HVAC	022B-TUL	Sustainment	2033	F&E	One Time	$125,849
Repair Electrical Systems	023A-TUL	Sustainment	2033	OPS	One Time	$89,953
Replace Electrical Systems	023B-TUL	Sustainment	2033	F&E	One Time	$382,095
Replace Central Vacuum	024-TUL	Sustainment	2034	OPS	One Time	$3,602
Site Improvements	025-TUL	Sustainment	2034	F&E	One Time	$62,614
Replace Roofing	026-TUL	Sustainment	2036	F&E	One Time	$110,998

TUL Project Funding By Year Chart



Project Builder Detail

JACOBS

Project Name: Security Upgrade
Project Number: 001-TUL
Project Type: Sustainment/Deferred Maintenance
Completion Year: 2020
Fund Type: F&E **Frequency:** 10
Estimate Cost: $45,564

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - ATCT			Replace Card Reader	1	Each	Yes	2014	$619
			Replace Electronic Lock	1	Each	Yes	2014	$213
			Replace Intrusion Detection Motion Detector, Interior	1	Each	Yes	2014	$572
			Replace Intercom Speaker	1	Each		2024	$442
TUL - Base Building			Replace Camera, Exterior, Closed Circuit, Fixed Color	1	Each	Yes	2014	$3,283
			Replace Camera, Interior, Closed Circuit, Fixed Color	2	Each	Yes	2014	$3,545
	Link		Replace Camera, Interior, Closed Circuit, Fixed Color	1	Each	Yes	2014	$1,773
			Replace Card Reader	5	Each	Yes	2014	$3,094
	Site		Replace Card Reader	1	Each	Yes	2014	$619
			Replace Electronic Lock	5	Each	Yes	2014	$1,066
	Link		Replace Intrusion Detection Motion Detector, Interior	1	Each	Yes	2014	$572
			Replace Intrusion Detection Motion Detector, Interior	2	Each	Yes	2014	$1,144
			Replace Monitor, Medium, Closed Circuit	1	Each	Yes	2014	$3,272

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - Base Building			Replace Security Control Panel	4	Each	Yes	2019	$24,466
	Site		Replace Intercom Speaker	1	Each		2024	$442
			Replace Intercom Speaker	1	Each		2024	$442

Project Builder Detail

JACOBS

Project Name: Refinish-Repair Interior & Exterior
Project Number: 002A-TUL
Project Type: Sustainment
Completion Year: 2020
Fund Type: OPS
Frequency: 10
Estimate Cost: $48,181

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - ATCT			Repair Steel Roof Access Ladder	12	Ln Ft		2020	$319
			Refinish Steel, Painted, Exterior, >=, 3 Stories	3,741	Sq Ft		2020	$5,626
	Cab		Refinish Steel, Painted, Exterior, >=, 3 Stories	587	Sq Ft		2020	$883
			Repair Steel, Painted Exterior Access Door (Catwalk) - JE	1	Each		2020	$265
			Refinish Steel, Painted, Interior Door	26	Each		2022	$519
			Refinish Steel, Painted, Interior Double Door	9	Each		2022	$354
			Replace Door Locks Steel, Painted, Interior Door	26	Each		2020	$4,765
			Replace Door Locks Steel, Painted, Interior Double Door	9	Each		2020	$1,649
			Repair Metal, Painted, Interior Stairs	747	Sq Ft		2020	$1,568
			Refinish Concrete Block, Painted, Interior Wall Finish	14,781	Sq Ft		2020	$9,541
			Refinish Plaster, Interior Wall Finish	1,340	Sq Ft		2020	$837
			Refinish Concrete, Painted Ceiling	930	Sq Ft		2020	$780
			Refinish Metal, Painted Ceiling	800	Sq Ft		2020	$654

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - ATCT			Refinish Plaster Ceiling	1,680	Sq Ft		2020	$1,373
			Repair (2% of Floors) Concrete Flooring	1,724	Sq Ft		2020	$184
TUL - Base Building			Replace Door Locks Steel, Painted, Exterior Door	1	Each		2022	$192
			Replace Door Locks Steel, Painted, Exterior Door	3	Each		2022	$575
	Link		Replace Door Locks Steel, Painted, Exterior Door	2	Each		2022	$384
			Replace Door Locks Steel, Painted, Exterior Door	1	Each		2020	$192
			Repair Steel, Painted, Exterior Door	1	Each		2020	$159
			Repair Steel, Painted, Exterior Door	3	Each		2020	$477
	Link		Repair Steel, Painted, Exterior Door	2	Each		2020	$318
			Replace Door Locks Wood, Solid Core, Painted, Interior Door	1	Each		2020	$183
			Replace Door Locks Steel, Painted, Interior Door	2	Each		2022	$367
			Replace Door Locks Steel, Painted, Interior Door	1	Each		2020	$183
			Replace Door Locks Steel, Painted, Interior Door	1	Each		2020	$183
			Repair (2% of Ceiling) Metal Ceiling	579	Sq Ft		2020	$200
			Repair (2% of Walls) Ceramic Tile, Interior Wall Finish, 16 Sq In	940	Sq Ft		2020	$146
			Repair (2% of Ceiling) Metal Ceiling	1,699	Sq Ft		2022	$586
			Refinish Concrete Block, Painted, Interior Wall Finish	2,305	Sq Ft		2022	$1,488
			Refinish Gypsum Board, Interior Wall Finish	7,226	Sq Ft		2022	$4,514
			Refinish Gypsum Board, Interior Wall Finish	834	Sq Ft		2020	$521
			Repair (2% of Floors) Ceramic Tile Flooring	335	Sq Ft		2020	$115

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - Base Building			Refinish Concrete Block, Painted, Interior Wall Finish	2,695	Sq Ft		2020	$1,740
			Refinish Plaster, Interior Wall Finish	4,500	Sq Ft		2020	$2,811
TUL - EG Building			Refinish Aluminum Louver, 1 Story	3	Each		2020	$90
			Replace Door Locks Steel, Painted, Exterior Door	1	Each		2020	$192
			Replace Door Locks Steel, Painted, Exterior Double Door	2	Each		2020	$384
			Repair Steel, Painted, Exterior Door	1	Each		2020	$159
			Repair Steel, Painted, Exterior Double Door	2	Each		2020	$708
			Replace Door Locks Steel, Painted, Interior Door	2	Each		2020	$367
			Repair (2% of Ceiling) Metal Ceiling	640	Sq Ft		2020	$221
			Refinish Concrete Block, Painted, Interior Wall Finish	1,109	Sq Ft		2020	$716
			Refinish Gypsum Board, Interior Wall Finish	568	Sq Ft		2020	$355
			Refinish Concrete, Painted Flooring	640	Sq Ft		2020	$338

Project Builder Detail

JACOBS

Project Name: Replace Carpet
Project Number: 002B-TUL
Project Type: Deferred Maintenance
Completion Year: 2020
Fund Type: F&E
Frequency: 10
Estimate Cost: $9,982

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - ATCT			Replace Carpet, Nylon, High Traffic, 20 oz	720	SqFt	Yes	2019	$4,396
TUL - Base Building			Replace Carpet, Nylon, High Traffic, 20 oz	915	SqFt	Yes	2018	$5,586

Project Builder Detail

JACOBS

Project Name: Replace Interior & Exterior
Project Number: 002C-TUL
Project Type: Sustainment/Deferred Maintenance
Completion Year: 2020
Fund Type: F&E
Frequency: One Time
Estimate Cost: $214,598

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - ATCT			Replace Aluminum Louver, >=, 3 Stories	6	Each	Yes	2018	$4,107
	Cab Roof		Replace Metal, Painted, Exterior Railing	74	LnFt	Yes	1988	$3,747
	Catwalk		Replace Metal, Painted, Exterior Railing	125	LnFt	Yes	1988	$6,330
			Replace Metal, Painted, Interior Railing	300	LnFt	Yes	2008	$7,039
			Replace Rubber Interior Stairs	278	SqFt		2022	$1,637
	Cab		Replace Wallpaper, Interior Wall Finish	400	SqFt	Yes	2019	$480
			Replace Vinyl Tile Flooring	1,420	SqFt	Yes	2019	$3,666
	Cab		Replace Acoustical Tile, Dropped Ceiling - JE	575	SqFt	Yes	2019	$1,445
TUL - Base Building			Replace Steel, Painted, Exterior Door	1	Each	Yes	2019	$896
	Link		Replace Steel, Painted, Exterior Door	2	Each	Yes	2019	$1,793
			Replace Clay Brick, Exterior, 1 Story	160	SqFt	Yes	2019	$3,607
			Replace Wood, Solid Core, Painted, Interior Door	6	Each	Yes	1998	$8,368
			Replace Wood, Solid Core, Painted, Interior Door	18	Each	Yes	2012	$25,103

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - Base Building			Replace Wood, Solid Core, Painted, Interior Double Door - JE	2	Each	Yes	2012	$4,895
	Site		Replace Metal, Painted, Exterior Railing	25	LnFt	Yes	2002	$1,266
	Roof		Replace Metal, Painted, Exterior Railing	65	LnFt	Yes	2002	$3,292
	Site		Replace Concrete, Exterior Stairs	30	SqFt		2022	$730
	Link		Replace Vinyl Tile Flooring	72	SqFt	Yes	1990	$186
			Replace Vinyl Tile Flooring	873	SqFt	Yes	1990	$2,254
			Replace Vinyl Tile Flooring	566	SqFt	Yes	1990	$1,461
	Link		Replace Acoustical Tile, Dropped Ceiling - JE	72	SqFt	Yes	1992	$181
			Replace Acoustical Tile, Dropped Ceiling - JE	168	SqFt	Yes	1992	$422
			Replace Acoustical Tile, Dropped Ceiling - JE	4,165	SqFt	Yes	1992	$10,467
			Replace Acoustical Interior Wall Tile, Fabric Faced	1,600	SqFt	Yes	2007	$14,489
			Replace Access Flooring w/ Laminate, Raised	1,420	SqFt	Yes	2012	$36,637
			Replace Access Flooring, (Computer Room Raised Floor) - JE	1,905	SqFt	Yes	2012	$59,117
			Replace Rubber Tile Flooring	172	SqFt		2022	$1,359
			Replace Acoustical Tile, Dropped Ceiling - JE	1,860	SqFt		2024	$4,674
TUL - EG Building			Replace Steel, Painted, Exterior Door	1	Each	Yes	2019	$896
			Replace Steel, Painted, Exterior Double Door	2	Each	Yes	2019	$4,054

Project Builder Detail

JACOBS

Project Name: Repair Interior & Exterior
Project Number: 002D-TUL
Project Type: Sustainment
Completion Year: 2020
Fund Type: OPS
Frequency: One Time
Estimate Cost: $44,624

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - ATCT			Minor Repair Precast Concrete Exterior Wall Panels - JE	723	Sq Ft		2020	$686
	Upper Levels		Minor Repair Precast Concrete Exterior Wall Panels - JE	785	Sq Ft		2020	$745
			Finish Repaired Steel, Painted, Exterior, >=, 3 Stories	3,741	Sq Ft		2020	$112
			Repair (2% of Walls) Steel, Painted, Exterior, >=, 3 Stories	3,741	Sq Ft		2020	$2,277
			Finish Repaired Concrete Block, Painted, Interior Wall Finish	14,781	Sq Ft		2020	$191
			Repair (2% of Walls) Concrete Block, Painted, Interior Wall Finish	14,781	Sq Ft		2020	$1,869
			Repoint (50% of Surface) Concrete Block, Painted, Interior Wall Finish	14,781	Sq Ft		2020	$18,971
			Repair (2% of Walls) Concrete, Interior Wall Finish	2,010	Sq Ft		2020	$597
			Repair (2% of Ceiling) Concrete, Painted Ceiling	930	Sq Ft		2020	$315
			Repair (2% of Ceiling) Metal, Painted Ceiling	800	Sq Ft		2020	$276
TUL - Base Building			Repair (2% of Walls) Clay Brick, Exterior, 1 Story	3,763	Sq Ft		2022	$1,697
			Repoint (50% of Surface) Clay Brick, Exterior, 1 Story	3,763	Sq Ft		2022	$8,084
			Repair (2% of Walls) Concrete Block, Painted, Interior Wall Finish	2,305	Sq Ft		2022	$291

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - Base Building			Repoint (50% of Surface) Concrete Block, Painted, Interior Wall Finish	2,305	Sq Ft		2022	$2,958
			Finish Repaired Gypsum Board, Interior Wall Finish	7,226	Sq Ft		2020	$90
			Repair (2% of Walls) Gypsum Board, Interior Wall Finish	7,226	Sq Ft		2020	$235
TUL - EG Building			Repair (2% of Walls) Clay Brick, Exterior, 1 Story	1,411	Sq Ft		2020	$636
			Repoint (50% of Surface) Clay Brick, Exterior, 1 Story	1,411	Sq Ft		2020	$3,031
			Repair (2% of Walls) Concrete Block, Painted, Interior Wall Finish	1,109	Sq Ft		2020	$140
			Repoint (50% of Surface) Concrete Block, Painted, Interior Wall Finish	1,109	Sq Ft		2020	$1,423

Project Builder Detail

JACOBS

Project Name: Replace Cab Glass and Windows
Project Number: 002E-TUL
Project Type: Sustainment/Deferred Maintenance
Completion Year: 2020
Fund Type: F&E
Frequency: One Time
Estimate Cost: $269,854

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - ATCT			Replace Glass Panels - ATCT Cab (Tiers 2 & 3) - JE	672	SqFt	Yes	1993	$257,615
			Replace Aluminum Fixed Window, >=, 3 Stories, 12 Sq Ft	3	Each	Yes	2008	$1,326
			Replace Aluminum Fixed Window, 2 Stories, 12 Sq Ft	1	Each	Yes	2008	$417
TUL - Base Building	Link		Replace Glass Curtain Wall	200	SqFt	Yes	2019	$9,319
			Replace Aluminum Fixed Window, 1 Story, 12 Sq Ft	1	Each		2022	$392
			Replace Aluminum Fixed Window, 1 Story, 12 Sq Ft	2	Each		2022	$785

Project Builder Detail

JACOBS

Project Name: Replace Roofing
Project Number: 003-TUL
Project Type: Deferred Maintenance
Completion Year: 2020
Fund Type: F&E
Frequency: One Time
Estimate Cost: $330,058

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - ATCT	Cab Roof		Replace Aluminum Gutter, Downspouts, Fittings	0.125	KLnFt	Yes	1978	$581
	Catwalk		Replace Flashing - JE	198	LnFt	Yes	2019	$516
	Cab Roof		Replace Flashing - JE	76	LnFt	Yes	2019	$198
	Cab Roof		Replace Tower Roof - JE	675	SqFt	Yes	2019	$161,909
	Catwalk		Replace Tower Roof - JE	660	SqFt	Yes	2019	$158,311
	Basement Roof		Replace Membrane Single-Ply Modified Bituminous/Thermoplastic Roof	700	SqFt		2025	$3,608
	Catwalk		Replace Roof Drain, 2.00 In	3	Each		2025	$1,124
TUL - Base Building			Replace Steel Roof Access Ladder	15	LnFt	Yes	2012	$1,271
	Entrance		Replace Metal Awning	60	SqFt	Yes	2002	$583
	Link		Replace Metal Awning	190	SqFt	Yes	2017	$1,845
TUL - EG Building			Replace Aluminum Gutter, Downspouts, Fittings	0.024	KLnFt	Yes	2008	$112

Project Builder Detail

JACOBS

Project Name: Renovate Elevator
Project Number: 004-TUL
Project Type: Deferred Maintenance
Completion Year: 2020
Fund Type: F&E
Frequency: One Time
Estimate Cost: $123,125

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - ATCT		EL-1	Renovate Elevator, Geared, 6-15 Floor, 3,500 Lbs, 350 fpm	1	Each	Yes	1983	$123,125

Project Builder Detail

JACOBS

Project Name: Replace Plumbing
Project Number: 005A-TUL
Project Type: Sustainment/Deferred Maintenance
Completion Year: 2020
Fund Type: OPS
Frequency: 15
Estimate Cost: $8,568

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - ATCT			Replace Valve Hose Bib	2	Each	Yes	1968	$79
	Ninth Floor	EWC-T2	Replace Drinking Fountain, Refrigerated	1	Each	Yes	2007	$1,290
	Seventh Floor	EWH-T2	Replace Water Heater, Electric, 5 Gal	1	Each	Yes	2012	$813
	Cab	EWC-T1	Replace Remote Water Chiller - JE	1	Each	Yes	2014	$1,182
TUL - Base Building			Replace Pressure Reducer Valve, 1.50 In	1	Each	Yes	1978	$513
			Replace Valve Hose Bib	1	Each	Yes	1982	$39
			Replace Backflow Preventer, 0.75 In	1	Each	Yes	1982	$790
		EWC-1	Replace Drinking Fountain, Refrigerated	1	Each	Yes	1999	$1,290
		WH-1	Replace Water Heater, Gas/Oil, 30 Gph	1	Each	Yes	2015	$2,572

Project Builder Detail

JACOBS

Project Name: Replace Plumbing
Project Number: 005B-TUL
Project Type: Sustainment/Deferred Maintenance
Completion Year: 2020
Fund Type: F&E
Frequency: One Time
Estimate Cost: $19,621

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - ATCT			Replace Pipe Insulation, Fiberglass, Cold Water - JE	0.283	KLnFt	Yes	1983	$1,051
			Replace Floor Drain	5	Each	Yes	1998	$1,274
			Replace Gate Valve, 3.00 In	2	Each	Yes	2014	$1,132
			Replace Pipe & Fittings, 1" Steel - JE	0.135	KLnFt	Yes	2019	$1,696
			Replace Pipe & Fittings, 2" Steel - JE	0.148	KLnFt	Yes	2019	$2,696
			Replace Lavatory, Vitreous China	1	Each		2023	$369
TUL - Base Building			Replace Pipe Insulation, Fiberglass, Cold Water - JE	0.050	KLnFt	Yes	1983	$186
			Replace Gate Valve, 3.00 In	1	Each	Yes	1989	$566
			Replace Pipe Insulation, Fiberglass, Cold Water - JE	0.374	KLnFt	Yes	1997	$1,389
			Replace Floor Drain	3	Each	Yes	1998	$764
			Replace Service Sink, Iron, Enamel	1	Each	Yes	2007	$1,300
			Replace Pipe & Fittings, 1" Steel - JE	0.185	KLnFt	Yes	2019	$2,324
			Replace Pipe & Fittings, 1" Steel - JE	0.077	KLnFt	Yes	2019	$967

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - Base Building			Replace Pipe & Fittings, 2" Steel - JE	0.112	KLnFt	Yes	2019	$2,040
			Replace Pipe & Fittings, 1" Steel - JE	0.050	KLnFt	Yes	2019	$628
		DG-1	Replace Pump & Motor Assembly Sump Pump, 0.500 HP	1	Each		2024	$358
TUL - EG Building			Replace Pipe & Fittings, 3/4" Copper - JE	0.026	KLnFt	Yes	2013	$784
			Replace Pipe Insulation, Fiberglass, Cold Water - JE	0.026	KLnFt	Yes	2013	$97

Project Builder Detail

JACOBS

Project Name: Repair HVAC
Project Number: 006-TUL
Project Type: Sustainment
Completion Year: 2020
Fund Type: OPS
Frequency: 7
Estimate Cost: $8,829

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - ATCT	Basement	P-T1C	Repair Circulation Pump, Chiller & Condenser Water, 5.000 HP	1	Each		2021	$93
	Basement	P-T1	Repair Circulation Pump, 2 HP, Hot Water - JE	1	Each		2020	$98
	Basement	B-T1, B-T2	Repair Boiler, Gas, 750 Mbh	2	Each		2020	$6,118
	Basement	P-T4	Repair Circulation Pump, 2 HP, Hot Water - JE	1	Each		2020	$98
TUL - Base Building		B-1	Repair Boiler, Gas, 300 Mbh	1	Each		2020	$2,422

Project Builder Detail

JACOBS

Project Name: Replace Stair Pressurization Fan
Project Number: 007-TUL
Project Type: Sustainment/Deferred Maintenance
Completion Year: 2020
Fund Type: F&E
Frequency: 15
Estimate Cost: $4,304

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - ATCT	Second Floor	SF-1	Replace Exhaust Fan, Propeller, 20,000 Cfm	1	Each	Yes	2015	$2,673
			Replace Motor Starter, 10.000 HP, 208 V	1	Each	Yes	2014	$1,631

Project Builder Detail

JACOBS

Project Name: Repair Electrical Systems
Project Number: 008A-TUL
Project Type: Sustainment
Completion Year: 2020
Fund Type: OPS
Frequency: 10
Estimate Cost: $40,943

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - ATCT			Repair Circuit Breaker, 15/20 Amp. - JE	22	Each		2020	$171
			Repair Circuit Breaker, 3 Ph., 600 V, 100 Amp	1	Each		2020	$441
			Repair Circuit Breaker, 3 Ph., 600 V, 100 Amp	1	Each		2020	$441
			Repair Circuit Breaker, 3 Ph., 600 V, 60 Amp	1	Each		2020	$441
			Repair Disconnect Switch, 100 Amp	3	Each		2020	$301
	Eighth Floor	T4	Repair Secondary Transformer, Dry, 15 kVA	1	Each		2020	$319
	Grade	T7	Repair Secondary Transformer, Dry, 150 kVA	1	Each		2020	$319
	Junction Level	T6	Repair Secondary Transformer, Dry, 30 kVA	1	Each		2020	$319
	Eighth Floor	T5	Repair Secondary Transformer, Dry, 30 kVA	1	Each		2020	$319
	Seventh Floor	T3	Repair Secondary Transformer, Dry, 30 kVA	1	Each		2020	$319
			Repair Disconnect Switch, 200 Amp	1	Each		2020	$106
			Repair Disconnect Switch, 100 Amp	1	Each		2020	$100
			Repair Disconnect Switch, 200 Amp	1	Each		2020	$106

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - ATCT			Repair Circuit Breaker, 3 Ph., 600 V, 60 Amp	7	Each		2020	$3,085
TUL - Base Building			Repair Circuit Breaker, 15/20 Amp. - JE	151	Each		2020	$1,177
			Repair Circuit Breaker, 3 Ph., 600 V, 100 Amp	1	Each		2020	$441
			Repair Circuit Breaker, 3 Ph., 600 V, 100 Amp	17	Each		2020	$7,492
			Repair Circuit Breaker, 3 Ph., 600 V, 60 Amp	13	Each		2020	$5,729
			Repair Circuit Breaker, 600 V, 400 Amp	10	Each		2020	$4,407
			Repair Disconnect Switch, 200 Amp	1	Each		2020	$106
			Repair Disconnect Switch, 30 Amp	6	Each		2020	$493
			Repair Disconnect Switch, 60 Amp	2	Each		2020	$173
		KLPN, P5	Repair Power Panel Board, 208 Y, 120 V, 100 Amp	2	Each		2020	$137
		CLPB1, CLPB2, ELPB-1	Repair Power Panel Board, 208 Y, 120 V, 225 Amp	3	Each		2020	$205
		CCP, EPP	Repair Power Panel Board, 208 Y, 120 V, 400 Amp	2	Each		2020	$137
			Repair Disconnect Switch, 200 Amp	2	Each		2020	$212
			Repair Circuit Breaker, 15/20 Amp. - JE	20	Each		2020	$156
TUL - EG Building			Repair Circuit Breaker, 3 Ph., 600 V, 100 Amp	2	Each		2020	$881
			Repair Circuit Breaker, 600 V, 400 Amp	6	Each		2020	$2,644
			Repair Circuit Breaker, 3 Ph., 600 V, 100 Amp	1	Each		2020	$441
			Repair Circuit Breaker, 3 Ph., 600 V, 100 Amp	3	Each		2020	$1,322
			Repair Circuit Breaker, 3 Ph., 600 V, 60 Amp	2	Each		2020	$881
			Repair Circuit Breaker, 600 V, 400 Amp	1	Each		2020	$441

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - EG Building			Repair Circuit Breaker, 600 V, 400 Amp	9	Each		2020	$3,966
			Repair Circuit Breaker, Main, 208 Y, 120 V, 600 Amp	2	Each		2020	$1,068
			Repair Circuit Breaker, Main, 208 Y, 120 V, 800 Amp	1	Each		2020	$534
			Repair Disconnect Switch, 100 Amp	3	Each		2020	$301
			Repair Disconnect Switch, 600 Amp	1	Each		2020	$184
		MDPEH Sec 1, Sec 2	Repair Power Panel Board, 480 Y, 277 V, 600 Amp	2	Each		2020	$206
		MDPNH	Repair Power Panel Board, 480 Y, 277 V, 800 Amp	1	Each		2020	$103
	Site	T-2	Repair Secondary Transformer, Dry, 150 kVA	1	Each		2020	$319

Project Builder Detail

JACOBS

Project Name: Replace Electrical Systems
Project Number: 008B-TUL
Project Type: Sustainment/Deferred Maintenance
Completion Year: 2020
Fund Type: F&E
Frequency: One Time
Estimate Cost: $519,759

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - ATCT			Replace Wiring Device, Switch	40	Each	Yes	1973	$1,075
			Replace Fluorescent Lighting Fixture, T12, 40 W	4	Each	Yes	1978	$624
			Replace Fluorescent Lighting Fixture, T12, 60 W	4	Each	Yes	1978	$624
			Replace Fluorescent Lighting Fixture, T12, 60 W	15	Each	Yes	1978	$2,340
			Replace Incandescent Lighting Fixture, Basic, 100 W	38	Each	Yes	1978	$5,210
	Cab Roof		Replace LED Obstruction Light - JE	4	Each	Yes	1978	$1,529
			Replace Receptacle, 120 V, 20 Amp	102	Each	Yes	1978	$5,991
			Replace Lightning Protection - JE	0.206	KLnFt	Yes	1983	$623
			Replace Circuit Breaker, 15/20 Amp. - JE	83	Each	Yes	1988	$2,485
			Replace Circuit Breaker, 3 Ph., 600 V, 100 Amp	1	Each	Yes	1988	$1,327
			Replace Circuit Breaker, 3 Ph., 600 V, 60 Amp	6	Each	Yes	1988	$7,217
	Seventh Floor	P7	Replace Power Panel Board, 208 Y, 120 V, 100 Amp	1	Each	Yes	1988	$3,809
	Eighth Floor	PP8	Replace Power Panel Board, 208 Y, 120 V, 100 Amp	1	Each	Yes	1988	$3,809

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - ATCT	Junction Level	Panel 14	Replace Power Panel Board, 208 Y, 120 V, 225 Amp	1	Each	Yes	1988	$6,146
			Replace Disconnect Switch, 60 Amp	1	Each	Yes	2008	$747
			Replace Motor Starter, 2.000 HP, 208 V	4	Each	Yes	2015	$2,733
			Replace Emergency Lighting Pack, 2 Light w/ Battery	3	Each	Yes	2017	$2,778
			Replace Circuit Breaker, 15/20 Amp. - JE	87	Each	Yes	2018	$2,605
	Eighth Floor	PP8A	Replace Power Panel Board, 208 Y, 120 V, 100 Amp	1	Each	Yes	2018	$3,809
	Junction Level	PP2	Replace Power Panel Board, 208 Y, 120 V, 100 Amp	1	Each	Yes	2018	$3,809
	Seventh Floor	7th Floor PP	Replace Power Panel Board, 208 Y, 120 V, 225 Amp	1	Each	Yes	2018	$6,146
	Basement	Basement LP	Replace Power Panel Board, 208 Y, 120 V, 225 Amp	1	Each	Yes	2018	$6,146
	Basement	BPPE, BPPE-2	Replace Power Panel Board, 208 Y, 120 V, 400 Amp	2	Each	Yes	2019	$14,588
			Replace Circuit Breaker, 3 Ph., 600 V, 100 Amp	14	Each	Yes	2019	$18,573
			Replace Circuit Breaker, 3 Ph., 600 V, 60 Amp	56	Each	Yes	2019	$67,356
			Replace Circuit Breaker, 600 V, 400 Amp	3	Each	Yes	2019	$12,823
			Replace Motor Starter, 2.000 HP, 208 V	1	Each		2022	$683
			Replace Emergency Lighting Pack, 2 Light w/ Battery	6	Each		2024	$5,556
			Replace Exit Lighting Fixture, LED	4	Each		2024	$1,193
			Replace Fluorescent Lighting Fixture, T8, 32 W	2	Each		2024	$312
	Cab		Replace Incandescent Lighting Fixture, Basic, 100 W	10	Each		2024	$1,371
			Replace Circuit Breaker, 15/20 Amp. - JE	6	Each		2024	$180
			Replace Circuit Breaker, 3 Ph., 600 V, 60 Amp	3	Each		2024	$3,608

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - ATCT	Basement	EL1	Replace Power Panel Board, 208 Y, 120 V, 100 Amp	1	Each		2024	$3,809
TUL - Base Building			Replace Fluorescent Lighting Fixture, T12, 40 W	8	Each	Yes	1978	$1,248
			Replace High Pressure Sodium Lighting Fixture, 250 W	1	Each	Yes	1978	$1,462
	Link		Replace Metal Halide Lighting Fixture, Wall Mount, 150 W	1	Each	Yes	1978	$429
			Replace Wiring Device, Switch	92	Each	Yes	1987	$2,473
			Replace Circuit Breaker, 3 Ph., 600 V, 100 Amp	2	Each	Yes	1988	$2,653
			Replace Circuit Breaker, 3 Ph., 600 V, 60 Amp	4	Each	Yes	1988	$4,811
			Replace Circuit Breaker, 600 V, 400 Amp	2	Each	Yes	1988	$8,548
		North PP	Replace Power Panel Board, 208 Y, 120 V, 600 Amp	1	Each	Yes	1988	$8,427
			Replace Fluorescent Lighting Fixture, T12, 40 W	22	Each	Yes	1992	$3,432
	Site		Replace Halogen Lighting Fixture, 100 W	1	Each	Yes	1992	$219
			Replace Incandescent Lighting Fixture, Basic, 100 W	11	Each	Yes	1992	$1,508
			Replace Receptacle, 120 V, 20 Amp	174	Each	Yes	1992	$10,220
			Replace Circuit Breaker, 15/20 Amp. - JE	79	Each	Yes	2002	$2,366
			Replace Circuit Breaker, 3 Ph., 600 V, 100 Amp	2	Each	Yes	2002	$2,653
			Replace Circuit Breaker, 3 Ph., 600 V, 60 Amp	7	Each	Yes	2002	$8,419
			Replace Circuit Breaker, 600 V, 400 Amp	1	Each	Yes	2002	$4,274
		Hall PP	Replace Power Panel Board, 208 Y, 120 V, 200 Amp	1	Each	Yes	2002	$5,199
		Hall LP	Replace Power Panel Board, 208 Y, 120 V, 200 Amp	1	Each	Yes	2002	$5,199
		North LP	Replace Power Panel Board, 208 Y, 120 V, 225 Amp	1	Each	Yes	2002	$6,146

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - Base Building			Replace Motor Starter, 2.000 HP, 208 V	1	Each	Yes	2015	$683
			Replace Motor Starter, 2.000 HP, 208 V	1	Each	Yes	2015	$683
			Replace Circuit Breaker, 15/20 Amp. - JE	46	Each	Yes	2018	$1,377
			Replace Circuit Breaker, 3 Ph., 600 V, 60 Amp	17	Each	Yes	2018	$20,447
			Replace Circuit Breaker, 600 V, 400 Amp	1	Each	Yes	2018	$4,274
		P4	Replace Power Panel Board, 208 Y, 120 V, 100 Amp	1	Each	Yes	2018	$3,809
		P2	Replace Power Panel Board, 208 Y, 120 V, 225 Amp	1	Each	Yes	2018	$6,146
			Replace Wiring Device, Switch	6	Each	Yes	2019	$161
			Replace Public Address Speaker	7	Each	Yes	2019	$1,850
	Courtyard		Replace Circuit Breaker, 15/20 Amp. - JE	10	Each	Yes	2019	$299
	Courtyard		Replace Circuit Breaker, 3 Ph., 600 V, 100 Amp	6	Each	Yes	2019	$7,960
	Courtyard		Replace Circuit Breaker, 600 V, 400 Amp	8	Each	Yes	2019	$34,194
	Courtyard		Replace Circuit Breaker, Main, 208 Y, 120 V, 1,200 Amp	1	Each	Yes	2019	$11,066
	Courtyard	MDPN	Replace Power Panel Board, 208 Y, 120 V, 1,200 Amp	1	Each	Yes	2019	$11,826
	Courtyard	Courtyard LP	Replace Power Panel Board, 208 Y, 120 V, 225 Amp	1	Each	Yes	2019	$6,146
	Courtyard	T1	Replace Secondary Transformer, Dry, 150 kVA	1	Each	Yes	2019	$11,859
			Replace Transient Voltage Surge Suppression Panel	1	Each	Yes	2019	$603
			Replace Compact Fluorescent Lighting Fixture, Digital Addressable Ballast, 32 W	12	Each		2024	$1,036
			Replace Fluorescent Lighting Fixture, T8, 25 W	23	Each		2024	$3,588
			Replace Fluorescent Lighting Fixture, T8, 25 W	1	Each		2024	$156

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - Base Building			Replace Fluorescent Lighting Fixture, T8, 32 W	78	Each		2024	$12,168
			Replace Grounded Fault Circuit Interrupter, 15 Amp	7	Each		2024	$404
			Replace Receptacle, 120 V, 20 Amp	15	Each		2024	$881
			Replace Circuit Breaker, 15/20 Amp. - JE	6	Each		2024	$180
			Replace Circuit Breaker, 600 V, 400 Amp	1	Each		2024	$4,274
		MCIN	Replace Power Panel Board, 208 Y, 120 V, 200 Amp	1	Each		2024	$5,199
			Replace Circuit Breaker, 15/20 Amp. - JE	68	Each		2025	$2,036
			Replace Circuit Breaker, 3 Ph., 600 V, 100 Amp	3	Each		2025	$3,980
			Replace Circuit Breaker, 3 Ph., 600 V, 60 Amp	2	Each		2025	$2,406
		P1, P3	Replace Power Panel Board, 208 Y, 120 V, 225 Amp	2	Each		2025	$12,292
TUL - EG Building			Replace Wiring Device, Switch	7	Each	Yes	2003	$188
			Replace Emergency Lighting Pack, 2 Light w/ Battery	2	Each	Yes	2008	$1,852
			Replace Fluorescent Lighting Fixture, T12, 40 W	12	Each	Yes	2008	$1,872
			Replace Fluorescent Lighting Fixture, T12, 60 W	3	Each	Yes	2008	$468
			Replace Grounded Fault Circuit Interrupter, 15 Amp	1	Each	Yes	2008	$58
	Exterior		Replace Incandescent Lighting Fixture, Basic, 100 W	5	Each	Yes	2008	$686
			Replace Receptacle, 120 V, 20 Amp	5	Each	Yes	2008	$294
			Replace Lightning Protection - JE	0.143	KLnFt	Yes	2013	$433
			Replace Circuit Breaker, 15/20 Amp. - JE	25	Each	Yes	2018	$749
			Replace Circuit Breaker, 3 Ph., 600 V, 100 Amp	2	Each	Yes	2018	$2,653

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - EG Building			Replace Circuit Breaker, 3 Ph., 600 V, 60 Amp	3	Each	Yes	2018	$3,608
			Replace Circuit Breaker, 600 V, 400 Amp	7	Each	Yes	2018	$29,920
		LPY	Replace Power Panel Board, 208 Y, 120 V, 100 Amp	1	Each	Yes	2018	$3,809
		MDPC, MDPE	Replace Power Panel Board, 208 Y, 120 V, 800 Amp	2	Each	Yes	2018	$19,119
	Roof		Replace Disconnect Switch, 60 Amp	1	Each	Yes	2019	$747

Project Builder Detail

JACOBS

Project Name: Replace Uninterruptible Power Supply
Project Number: 009-TUL
Project Type: Sustainment/Deferred Maintenance
Completion Year: 2020
Fund Type: F&E
Frequency: 15
Estimate Cost: $79,318

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - EG Building			Replace Control Panel, Load Bank - JE	1	Each	Yes	2017	$2,427
		UPS	Replace Uninterruptible Power Supply, 100 KW - JE	1	Each	Yes	2017	$60,478
	Roof		Replace Load Bank, 200 kW	1	Each	Yes	2017	$16,413

Project Builder Detail

JACOBS

Project Name: Replace Appliances and Equipment
Project Number: 010-TUL
Project Type: Sustainment/Deferred Maintenance
Completion Year: 2020
Fund Type: OPS **Frequency:** 10
Estimate Cost: $54,675

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - ATCT	Ninth Floor	D-3	Replace Disposal, Garbage, Electric	1	Each	Yes	2014	$401
			Replace Range/Oven	1	Each	Yes	2014	$4,594
	Cab		Replace Refrigerator, Mini, 3 Cu Ft	1	Each	Yes	2014	$325
			Replace Dishwasher, Electric	1	Each	Yes	2014	$5,259
			Replace Kitchen Exhaust Hood, Domestic - JE	1	Each	Yes	2019	$481
			Replace Refrigerator, Domestic	1	Each		2022	$1,203
TUL - Base Building			Replace Range/Oven	1	Each	Yes	1968	$4,594
			Replace Cooking Range, Commercial	1	Each	Yes	2014	$2,322
		D-1, D-2	Replace Disposal, Garbage, Electric	2	Each	Yes	2014	$801
			Replace Kitchen Cabinet, Wood - JE	12	Each	Yes	2014	$14,510
			Replace Microwave Oven	1	Each	Yes	2014	$238
			Replace Range/Oven	1	Each	Yes	2014	$4,594
			Replace Refrigerator, Domestic	1	Each	Yes	2014	$1,203

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - Base Building			Replace Dishwasher, Electric	1	Each	Yes	2014	$5,259
			Replace Kitchen Exhaust Hood, Commercial	1	Each	Yes	2019	$6,005
			Replace Kitchen Exhaust Hood, Domestic - JE	1	Each	Yes	2019	$481
			Replace Refrigerator, Domestic	2	Each		2025	$2,405

Project Builder Detail

JACOBS

Project Name: Site Improvements
Project Number: 011A-TUL
Project Type: Sustainment/Deferred Maintenance
Completion Year: 2020
Fund Type: F&E
Frequency: 10
Estimate Cost: $97,694

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - Base Building	Site		Resurface Asphaltic Pavement, Parking Lot, >10,000 sq.ft - JE	23,500	SqFt	Yes	1982	$97,694

Project Builder Detail

JACOBS

Project Name: Site Improvements
Project Number: 011B-TUL
Project Type: Sustainment/Deferred Maintenance
Completion Year: 2020
Fund Type: F&E
Frequency: One Time
Estimate Cost: $37,616

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - Base Building			Replace Concrete Curb & Gutter - JE	907	LnFt	Yes	1997	$11,148
	Site		Replace Concrete Sidewalk, 4" Thick - JE	2,356	SqFt	Yes	1997	$11,934
	Site		Replace Concrete Sidewalk, 4" Thick - JE	1,678	SqFt	Yes	2013	$8,500
	Site		Replace Outdoor Pole Light - JE	2	Each	Yes	1992	$5,273
	Site		Replace Concrete Base Outdoor Pole Light - JE	2	Each	Yes	1992	$761

Project Builder Detail

JACOBS

Project Name: Replace HVAC Controls
Project Number: 012A-TUL
Project Type: Sustainment/Deferred Maintenance
Completion Year: 2023
Fund Type: F&E
Frequency: 10
Estimate Cost: $30,893

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - ATCT			Replace Direct Digital Controls, System Points	24	Each	Yes	2007	$13,900
			Replace Metasys Controllers - JE	3	Each	Yes	2012	$3,429
TUL - Base Building			Replace Direct Digital Controls, System Points	18	Each	Yes	2007	$10,425
			Replace Metasys Controllers - JE	2	Each	Yes	2012	$2,286
TUL - EG Building			Replace Thermostat	2	Each	Yes	1998	$427
			Replace Thermostat	1	Each	Yes	2014	$213
			Replace Thermostat	1	Each		2020	$213

Project Builder Detail

JACOBS

Project Name: Replace HVAC
Project Number: 012B-TUL
Project Type: Sustainment/Deferred Maintenance
Completion Year: 2023
Fund Type: F&E
Frequency: One Time
Estimate Cost: $463,404

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - ATCT	Basement	AC-2	Replace Air Compressor, 2.000 HP	1	Each	Yes	1983	$6,264
	Basement	AD-2	Replace Compressed Air Dryer	1	Each		2025	$5,533
	Basement	AHU-T2, AHU-T3	Replace Air Handler, Single Zone, 2,500 Cfm	2	Each	Yes	1977	$15,293
	Cab Roof	EF-T1	Replace Exhaust Fan, Roof Mounted, 2,000 Cfm	1	Each	Yes	1977	$1,213
			Replace Pipe Insulation, Fiberglass, Heating Water/Steam - JE	0.293	KLnFt	Yes	1983	$1,671
			Replace Pipe Insulation, Fiberglass, Chilled Water - JE	0.292	KLnFt	Yes	1983	$1,113
			Replace Duct Insulation, Fiberglass - JE	1,299	SqFt	Yes	1993	$4,572
			Replace Ductwork - JE	1,624	Lbs	Yes	1993	$10,577
	Seventh Floor	AC-3	Replace Air Conditioner, Window, 2.0 Ton	1	Each	Yes	2009	$1,454
	Basement	P-T1	Replace Circulation Pump, 2 HP, Hot Water - JE	1	Each	Yes	2011	$4,707
			Replace Calibrated Balancing Valve, 2.00 In	2	Each	Yes	2014	$312
	Basement	P-T1C	Replace Circulation Pump, Chiller & Condenser Water, 5.000 HP	1	Each	Yes	2014	$4,578
	Basement	P-T2, P-T3	Replace Circulator Pump, 1 HP, Hot Water - JE	2	Each	Yes	2015	$8,952

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - ATCT	Seventh Floor	AHU-T1	Replace Air Handler, Multizone, 6,500 Cfm	1	Each	Yes	2016	$19,465
			Replace Check Valve, 4.00 In	2	Each	Yes	2017	$4,015
	Basement	CPF-2	Replace Chemical Bypass Pot Feeder - JE	1	Each	Yes	2017	$1,073
			Replace Flow Control Valve, Motorized, 2.00 In	2	Each	Yes	2019	$3,474
	Cab	CLF-1	Replace Residential Type Ceiling Fan	1	Each		2023	$239
TUL - Base Building		AD-1	Replace Compressed Air Dryer	1	Each	Yes	2003	$5,533
		AC-1	Replace Air Compressor, 0.750 HP	1	Each	Yes	2013	$3,012
		EF-3	Replace Exhaust Fan, Roof Mounted, 400 Cfm	1	Each	Yes	1977	$778
		AHU-4	Replace Air Handler, Single Zone, 5,000 Cfm	1	Each	Yes	1991	$13,486
		EF-2	Replace Exhaust Fan, Roof Mounted, 500 Cfm	1	Each	Yes	1991	$1,006
		RC-1 thru RC-8	Replace Secondary Coil, 288 Sq In	8	Each	Yes	1995	$4,090
			Replace Pipe Insulation, Fiberglass, Heating Water/Steam - JE	0.294	KLnFt	Yes	1997	$1,676
			Replace Ball Valve, 2.00 In	2	Each	Yes	2012	$1,147
			Replace Calibrated Balancing Valve, 2.00 In	1	Each	Yes	2014	$156
		AHU-5	Replace Air Handler, Multizone, 10,000 Cfm	1	Each	Yes	2016	$29,663
			Replace Check Valve, 4.00 In	1	Each	Yes	2017	$2,008
		CPF-1	Replace Chemical Bypass Pot Feeder - JE	1	Each	Yes	2017	$1,073
	Roof	ACC-1, ACC-2	Replace Condenser, Air-Cooled, 15.0 Ton	2	Each		2021	$13,901
	Roo	ACC-3, ACC-4	Replace Condenser, Air-Cooled, 20.0 Ton	2	Each		2021	$20,278
	Grade	CU-1, CU-2	Replace Condenser, Air-Cooled, 3.0 Ton	2	Each		2021	$3,934

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - Base Building			Replace Pipe Insulation, Fiberglass, Heating Water/Steam - JE	0.045	KLnFt		2022	$257
		AHU-1, AHU-2	Replace Air Handler, Single Zone, 1,300 Cfm	2	Each		2023	$12,318
		EF-1	Replace Exhaust Fan, Propeller, 375 Cfm	1	Each		2023	$549
		CLF-2, CLF-3	Replace Residential Type Ceiling Fan	2	Each		2023	$477
		CRU-1, CRU-2	Replace Air Conditioner, Computer Room, Air-Cooled (CRAC), 15.0 Ton	2	Each		2026	$107,218
		CRU-3, CRU-4	Replace Air Conditioner, Computer Room, Air-Cooled (CRAC), 20.0 Ton	2	Each		2026	$129,328
TUL - EG Building		EUH-1, EUH-2	Replace Unit Heater, Electric - JE	2	Each	Yes	2003	$1,784
	Grade	CU-3	Replace Condenser, Air-Cooled, 7.5 Ton	1	Each		2021	$3,844
		AHU-3	Replace Air Handler, Single Zone, 2,500 Cfm	1	Each		2023	$7,647
		EF-2	Replace Exhaust Fan, Propeller, 1,000 Cfm	1	Each		2023	$1,021
			Replace Duct Insulation, Fiberglass - JE	186	SqFt		2023	$655
			Replace Ductwork - JE	232	Lbs		2023	$1,511
		TF-1	Replace Exhaust Fan, Propeller, 375 Cfm	1	Each		2024	$549

Project Builder Detail

JACOBS

Project Name: Repair HVAC
Project Number: 012C-TUL
Project Type: Sustainment
Completion Year: 2023
Fund Type: OPS
Frequency: One Time
Estimate Cost: $33,330

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - ATCT	Ninth Floor	AC-1	Repair Air Conditioner, Window, 1.0 Ton	1	Each		2025	$107
	Junction Level	TAHU-1, TAHU-2	Repair Air Handler, Single Zone, 1,300 Cfm	2	Each		2026	$2,834
	Top of Boiler Flue	DF-1	Repair Exhaust Fan, Roof Mounted, 1,500 Cfm	1	Each		2023	$197
	Grade	TCH-1	Repair Chiller, Reciprocal, Air-Cooled, 30.0 Ton	1	Each		2023	$22,640
	Eighth Floor	AC-2	Repair Air Conditioner, Window, 2.0 Ton	1	Each		2023	$109
	Catwalk	TCU-1, TCU-2	Repair Condenser, Air-Cooled, 3.0 Ton	2	Each		2023	$1,416
TUL - Base Building		SF-2	Repair Exhaust Fan, Propeller, 800 Cfm	1	Each		2023	$197
		EF-2	Repair Exhaust Fan, Roof Mounted, 500 Cfm	1	Each		2023	$197
	Roof	CU-4	Repair Condenser, Air-Cooled, 10.0 Ton	1	Each		2023	$1,032
	Grade	CU-5	Repair Condenser, Air-Cooled, 20.0 Ton	1	Each		2023	$1,323
TUL - EG Building		RTU-1	Repair Air Conditioner, Rooftop, Single Zone, 7.5 Ton	1	Each		2022	$3,278

Project Builder Detail

JACOBS

Project Name: Replace UPS Batteries
Project Number: 013-TUL
Project Type: Sustainment
Completion Year: 2024
Fund Type: OPS
Frequency: 10
Estimate Cost: $16,630

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - EG Building			Replace UPS Battery - JE	30	Each		2024	$16,630

Project Builder Detail

JACOBS

Project Name: Repair Electrical Systems
Project Number: 014-TUL
Project Type: Sustainment
Completion Year: 2025
Fund Type: OPS **Frequency:** 5
Estimate Cost: $1,495

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - ATCT			Replace Coil Motor Starter, 10.000 HP, 208 V	1	Each		2025	$217
			Replace Coil Motor Starter, 2.000 HP, 208 V	4	Each		2025	$852
			Replace Coil Motor Starter, 2.000 HP, 208 V	1	Each		2025	$213
TUL - Base Building			Replace Coil Motor Starter, 2.000 HP, 208 V	1	Each		2025	$213

Project Builder Detail

JACOBS

Project Name: Site Improvements
Project Number: 015-TUL
Project Type: Sustainment
Completion Year: 2025
Fund Type: OPS
Frequency: 10
Estimate Cost: $13,830

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - Base Building	Site		Repair Asphaltic Pavement, Parking Lot, >10,000 sq.ft - JE	23,500	Sq Ft		2025	$12,142
	Site		Replace 400W H.P.S. Lamp Outdoor Pole Light - JE	2	Each		2022	$1,125
	Site		Replace 400W H.P.S. Lamp Outdoor Pole Light - JE	1	Each		2029	$563

Project Builder Detail

JACOBS

Project Name: Fire & Life Safety Upgrade
Project Number: 016-TUL
Project Type: Sustainment
Completion Year: 2027
Fund Type: F&E
Frequency: One Time
Estimate Cost: $42,796

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - ATCT			Replace Fire Extinguisher	14	Each		2024	$4,929
	First Floor	FACP-1	Replace Fire Alarm Control Panel	1	Each		2027	$2,842
	Cab	FAAP-1	Replace Fire Annunciator Panel - JE	1	Each		2027	$889
	Ninth Floor	KFS-1	Replace Kitchen Fire Suppression System (CO2)	1	Each		2032	$2,441
			Replace Manual Pull Station	12	Each		2027	$1,122
			Replace Remote Door Release System - JE	5	Each		2027	$8,231
			Replace Smoke Detector	20	Each		2027	$2,532
			Replace Smoke Detector, Duct	4	Each		2027	$1,684
			Replace Fire Alarm Horn & Strobe	15	Each		2032	$2,201
TUL - Base Building			Replace Fire Extinguisher	5	Each		2024	$1,760
	TRACON	FAAP-2	Replace Fire Annunciator Panel - JE	1	Each		2027	$889
			Replace Manual Pull Station	2	Each		2027	$187
	Link		Replace Remote Door Release System - JE	1	Each		2027	$1,646

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - Base Building			Replace Smoke Detector	36	Each		2027	$4,557
			Replace Smoke Detector, Duct	3	Each		2027	$1,263
			Replace Fire Alarm Horn & Strobe	28	Each		2032	$4,108
TUL - EG Building			Replace Heat Detector	1	Each		2027	$121
			Replace Manual Pull Station	3	Each		2027	$280
			Replace Smoke Detector	2	Each		2027	$253
			Replace Smoke Detector, Duct	1	Each		2027	$421
			Replace Fire Alarm Horn & Strobe	3	Each		2032	$440

Project Builder Detail

JACOBS

Project Name: Replace Cab Glass Shades
Project Number: 017-TUL
Project Type: Sustainment
Completion Year: 2028
Fund Type: F&E
Frequency: 10
Estimate Cost: $17,386

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - ATCT			Replace Cab Glass Shades - JE	672	SqFt		2027	$8,693
			Replace Cab Glass Shades - JE	672	SqFt		2029	$8,693

Project Builder Detail

JACOBS

Project Name: Repair Roofing
Project Number: 018-TUL
Project Type: Sustainment
Completion Year: 2029
Fund Type: OPS
Frequency: One Time
Estimate Cost: $18,363

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - ATCT	Cab Roof		Minor Repair Tower Roof - JE	675	Sq Ft		2029	$284
	Catwalk		Minor Repair Tower Roof - JE	660	Sq Ft		2029	$278
	Basement Roof		Repair Single-Ply Modified Bituminous/Thermoplastic Roof	700	Sq Ft		2029	$1,326
TUL - Base Building			Non-Destructive Moisture Inspection Single-Ply PVC Membrane Roof - JE	10,000	Sq Ft		2029	$717
			Repair Single-Ply PVC Membrane Roof - JE	10,000	Sq Ft		2029	$12,985
	Link		Repair Single-Ply PVC Membrane Roof - JE	72	Sq Ft		2029	$93
	Link		Refinish Metal Awning	190	Sq Ft		2029	$227
	Link		Repair Metal Awning	190	Sq Ft		2029	$260
	Patio Area		Refinish Metal Awning	450	Sq Ft		2029	$538
	Patio Area		Repair Metal Awning	450	Sq Ft		2029	$616
TUL - EG Building			Repair Single-Ply PVC Membrane Roof - JE	800	Sq Ft		2029	$1,039

Project Builder Detail

JACOBS

Project Name: EG Upgrade
Project Number: 019-TUL
Project Type: Sustainment
Completion Year: 2029
Fund Type: F&E
Frequency: One Time
Estimate Cost: $165,257

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - EG Building		FLM-1	Replace Controller, Fuel Oil Level - JE	1	Each		2034	$800
		DT-1	Replace Generator Day Tank, 65 Gal	1	Each		2034	$616
			Replace Control Panel, Load Bank - JE	1	Each		2022	$2,427
	Grade		Replace Load Bank, 300 KW - JE	1	Each		2022	$10,363
		ATS	Replace Transfer Switch, Auto, 600 V, 600 Amp	1	Each		2022	$12,920
			Replace Battery Charger	1	Each		2024	$1,209
			Replace Generator Battery, Wet, 1 V	2	Each		2028	$947
			Replace Generator, Diesel, 300 kW	1	Each		2029	$135,975

Project Builder Detail

JACOBS

Project Name: Replace Interior & Exterior
Project Number: 020A-TUL
Project Type: Sustainment
Completion Year: 2033
Fund Type: F&E
Frequency: One Time
Estimate Cost: $169,172

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - ATCT			Finish Replaced Steel, Painted, Exterior, >=, 3 Stories	3,741	Sq Ft		2033	$8,874
	Cab		Finish Replaced Steel, Painted, Exterior, >=, 3 Stories	587	Sq Ft		2033	$1,392
	Cab		Replace Steel, Painted, Exterior, >=, 3 Stories	587	SqFt		2033	$17,860
			Replace Steel, Painted Exterior Access Door (Catwalk) - JE	1	Each		2038	$440
			Finish Replaced Steel, Painted, Interior Door	26	Each		2033	$519
			Finish Replaced Steel, Painted, Interior Double Door	9	Each		2033	$354
			Replace Steel, Painted, Interior Door	26	Each		2033	$23,307
			Replace Steel, Painted, Interior Double Door	9	Each		2033	$13,719
			Finish Replaced Plaster, Interior Wall Finish	1,340	Sq Ft		2033	$837
			Finish Replaced Plaster Ceiling	1,680	Sq Ft		2033	$1,373
			Replace Plaster, Interior Wall Finish	1,340	SqFt		2033	$9,464
			Replace Plaster Ceiling	1,680	SqFt		2033	$11,865
	Unisex Restroom		Replace Plastic, Fiberglass Reinforced, Interior Wall Panels	62	SqFt		2039	$145

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - Base Building			Replace Steel, Painted, Exterior Door	1	Each		2033	$896
			Replace Wood, Solid Core, Painted, Interior Door	3	Each		2029	$4,184
			Remove and Reinstall Toilet Partitions - JE	23	LnFt		2030	$1,547
			Replace Steel, Painted, Interior Door	1	Each		2033	$896
			Finish Replaced Wood, Solid Core, Painted, Interior Door	6	Each		2038	$120
			Replace Carpet, Nylon, High Traffic, 20 oz	2,051	SqFt		2027	$12,522
			Replace Carpet on Access Flooring - JE	1,905	SqFt		2029	$21,106
			Replace Acoustical Tile, Dropped Ceiling - JE	229	SqFt		2030	$575
			Finish Replaced Plaster, Interior Wall Finish	4,500	Sq Ft		2033	$2,811
			Replace Clay Brick, Interior Wall Finish	183	SqFt		2033	$2,585
			Replace Plaster, Interior Wall Finish	4,500	SqFt		2033	$31,781

Project Builder Detail

JACOBS

Project Name: Refinish-Repair Interior & Exterior
Project Number: 020B-TUL
Project Type: Sustainment
Completion Year: 2033
Fund Type: OPS
Frequency: One Time
Estimate Cost: $27,259

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - ATCT			Refinish Aluminum Louver, >=, 3 Stories	6	Each		2028	$421
			Repair Glass Panels - ATCT Cab (Tiers 2 & 3) - JE	672	Sq Ft		2038	$17,366
			Refinish Metal, Painted, Interior Railing	300	Ln Ft		2033	$189
			Refinish Metal, Painted, Interior Stairs	747	Sq Ft		2033	$470
	Catwalk		Repair Metal, Painted, Exterior Railing	125	Ln Ft		2033	$112
			Repair Metal, Painted, Interior Railing	300	Ln Ft		2033	$268
TUL - Base Building			Repair Steel Roof Access Ladder	15	Ln Ft		2032	$399
			Repoint (50% of Surface) Clay Brick, Exterior, 1 Story	160	Sq Ft		2033	$344
			Refinish Wood, Solid Core, Painted, Interior Door	6	Each		2033	$120
			Replace Door Locks Wood, Solid Core, Painted, Interior Door	18	Each		2033	$3,299
			Replace Locks Wood, Solid Core, Painted, Interior Double Door - JE	2	Each		2033	$402
			Replace Door Locks Wood, Solid Core, Painted, Interior Door	1	Each		2033	$183
			Replace Door Locks Wood, Solid Core, Painted, Interior Door	6	Each		2028	$1,100

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - Base Building			Replace Door Locks Wood, Solid Core, Painted, Interior Door	3	Each		2039	$550
			Minor Repair Acoustical Interior Wall Tile, Fabric Faced	1,600	Sq Ft		2033	$641
			Repair (2% of Floors) Access Flooring w/ Laminate, Raised	1,420	Sq Ft		2032	$733
			Minor Repair Access Flooring, (Computer Room Raised Floor) - JE	1,905	Sq Ft		2032	$662

Project Builder Detail

JACOBS

Project Name: Replace Plumbing
Project Number: 021A-TUL
Project Type: Sustainment
Completion Year: 2033
Fund Type: F&E
Frequency: One Time
Estimate Cost: $13,723

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - ATCT			Replace Pipe & Fittings, 2" Cast Iron - JE	0.212	KLnFt		2033	$4,925
			Replace Pipe & Fittings, 4" Cast Iron - JE	0.169	KLnFt		2033	$7,183
TUL - Base Building			Replace Pipe & Fittings, 4" Cast Iron - JE	0.038	KLnFt		2033	$1,615

Project Builder Detail

JACOBS

Project Name: Replace Plumbing
Project Number: 021B-TUL
Project Type: Sustainment
Completion Year: 2033
Fund Type: OPS
Frequency: One Time
Estimate Cost: $4,788

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - ATCT	Cab	EWH-T3	Replace Water Heater, Instant Hot, 120 Gph	1	Each		2033	$532
	Basement	SP-1, SP-2	Replace Pump & Motor Assembly Sump Pump, 0.500 HP	2	Each		2035	$715
TUL - Base Building		WH-2	Replace Water Heater, Gas/Oil, 30 Gph	1	Each		2027	$2,572
		P-3	Replace Circulator Pump, Hot Water, 0.083 HP	1	Each		2038	$969

Project Builder Detail

JACOBS

Project Name: Repair HVAC
Project Number: 022A-TUL
Project Type: Sustainment
Completion Year: 2033
Fund Type: OPS
Frequency: One Time
Estimate Cost: $112,616

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - ATCT	Seventh Floor	AC-3	Repair Air Conditioner, Window, 2.0 Ton	1	Each		2033	$109
	Cab Roof	EF-T1	Repair Exhaust Fan, Roof Mounted, 2,000 Cfm	1	Each		2033	$197
	Ninth Floor	EF-T2	Repair Exhaust Fan, Bathroom 150 cfm - JE	1	Each		2033	$162
			Replace Valve Actuator Flow Control Valve, Motorized, 2.00 In	2	Each		2033	$1,693
	Seventh Floor	AHU-T1	Repair Air Handler, Multizone, 6,500 Cfm	1	Each		2033	$1,993
	Basement	AHU-T2, AHU-T3	Repair Air Handler, Single Zone, 2,500 Cfm	2	Each		2028	$2,870
	Second Floor	SF-1	Repair Exhaust Fan, Propeller, 20,000 Cfm	1	Each		2029	$342
TUL - Base Building		AHU-4	Repair Air Handler, Single Zone, 5,000 Cfm	1	Each		2033	$1,475
		EF-3	Repair Exhaust Fan, Roof Mounted, 400 Cfm	1	Each		2033	$197
		AHU-5	Repair Air Handler, Multizone, 10,000 Cfm	1	Each		2027	$2,097
		AHU-1, AHU-2	Repair Air Handler, Single Zone, 1,300 Cfm	2	Each		2033	$2,834
	Roof	ACC-1, ACC-2	Repair Condenser, Air-Cooled, 15.0 Ton	2	Each		2033	$2,294
	Roo	ACC-3, ACC-4	Repair Condenser, Air-Cooled, 20.0 Ton	2	Each		2033	$2,647

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - Base Building	Grade	CU-1, CU-2	Repair Condenser, Air-Cooled, 3.0 Ton	2	Each		2033	$1,416
		EF-1	Repair Exhaust Fan, Propeller, 375 Cfm	1	Each		2034	$197
		CRU-1, CRU-2	Repair Air Conditioner, Computer Room, Air-Cooled (CRAC), 15.0 Ton	2	Each		2037	$39,181
		CRU-3, CRU-4	Repair Air Conditioner, Computer Room, Air-Cooled (CRAC), 20.0 Ton	2	Each		2037	$49,685
TUL - EG Building		EUH-1, EUH-2	Repair Unit Heater, Electric - JE	2	Each		2028	$402
		AHU-3	Repair Air Handler, Single Zone, 2,500 Cfm	1	Each		2033	$1,435
	Grade	CU-3	Repair Condenser, Air-Cooled, 7.5 Ton	1	Each		2033	$996
		EF-2	Repair Exhaust Fan, Propeller, 1,000 Cfm	1	Each		2034	$197
		TF-1	Repair Exhaust Fan, Propeller, 375 Cfm	1	Each		2035	$197

Project Builder Detail

JACOBS

Project Name: Replace HVAC
Project Number: 022B-TUL
Project Type: Sustainment
Completion Year: 2033
Fund Type: F&E
Frequency: One Time
Estimate Cost: $125,849

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - ATCT	Basement	P-T4	Replace Circulation Pump, 2 HP, Hot Water - JE	1	Each		2033	$4,707
	Catwalk	TCU-1, TCU-2	Replace Condenser, Air-Cooled, 3.0 Ton	2	Each		2033	$3,934
	Ninth Floor	EF-T2	Replace Exhaust Fan, Bathroom 150 cfm - JE	1	Each		2033	$250
			Replace Pipe & Fittings, 2" Steel - JE	0.585	KLnFt		2033	$10,660
			Replace Ball Valve, 2.00 In	6	Each		2034	$3,441
	Junction Level	TAHU-1, TAHU-2	Replace Air Handler, Single Zone, 1,300 Cfm	2	Each		2035	$12,318
	Top of Boiler Flue	DF-1	Replace Exhaust Fan, Roof Mounted, 1,500 Cfm	1	Each		2035	$1,177
			Replace Check Valve, 4.00 In	1	Each		2036	$2,008
	Ninth Floor	AC-1	Replace Air Conditioner, Window, 1.0 Ton	1	Each		2036	$1,313
	Grade	TCH-1	Replace Chiller, Reciprocal, Air-Cooled, 30.0 Ton	1	Each		2038	$48,313
	Eighth Floor	AC-2	Replace Air Conditioner, Window, 2.0 Ton	1	Each		2039	$1,454
TUL - Base Building		P-1, P-2	Replace Circulator Pump, 1 HP, Hot Water - JE	2	Each		2029	$8,952
	Roof	CU-4	Replace Condenser, Air-Cooled, 10.0 Ton	1	Each		2034	$4,781

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - Base Building	Grade	CU-5	Replace Condenser, Air-Cooled, 20.0 Ton	1	Each		2034	$10,139
		SF-2	Replace Exhaust Fan, Propeller, 800 Cfm	1	Each		2035	$914
TUL - EG Building		RTU-1	Replace Air Conditioner, Rooftop, Single Zone, 7.5 Ton	1	Each		2027	$11,488

Project Builder Detail

JACOBS

Project Name: Repair Electrical Systems
Project Number: 023A-TUL
Project Type: Sustainment
Completion Year: 2033
Fund Type: OPS
Frequency: One Time
Estimate Cost: $89,953

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - ATCT			Replace Motion Sensing Wall Switch	1	Each		2033	$93
			Repair Circuit Breaker, 15/20 Amp. - JE	83	Each		2033	$647
			Repair Circuit Breaker, 15/20 Amp. - JE	87	Each		2033	$678
			Repair Circuit Breaker, 3 Ph., 600 V, 100 Amp	1	Each		2033	$441
			Repair Circuit Breaker, 3 Ph., 600 V, 100 Amp	14	Each		2033	$6,170
			Repair Circuit Breaker, 3 Ph., 600 V, 60 Amp	6	Each		2033	$2,644
			Repair Circuit Breaker, 3 Ph., 600 V, 60 Amp	56	Each		2033	$24,679
			Repair Circuit Breaker, 600 V, 400 Amp	3	Each		2033	$1,322
			Replace Ballast & Lamps Fluorescent Lighting Fixture, T12, 40 W	4	Each		2033	$280
			Replace Ballast & Lamps Fluorescent Lighting Fixture, T12, 60 W	4	Each		2033	$299
			Replace Ballast & Lamps Fluorescent Lighting Fixture, T12, 60 W	15	Each		2033	$1,122
			Repair Wiring Device, Switch	40	Each		2033	$951
	Basement	BPPE, BPPE-2	Repair Power Panel Board, 208 Y, 120 V, 400 Amp	2	Each		2033	$137

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - ATCT			Repair Circuit Breaker, 3 Ph., 600 V, 60 Amp	3	Each		2033	$1,322
			Replace Lens Emergency Lighting Pack, 2 Light w/ Battery	6	Each		2033	$139
			Replace Ballast & Lamps Fluorescent Lighting Fixture, T8, 32 W	2	Each		2033	$159
TUL - Base Building			Repair Circuit Breaker, 15/20 Amp. - JE	79	Each		2033	$616
			Repair Circuit Breaker, 3 Ph., 600 V, 100 Amp	2	Each		2033	$881
			Repair Circuit Breaker, 3 Ph., 600 V, 60 Amp	7	Each		2033	$3,085
			Repair Circuit Breaker, 600 V, 400 Amp	1	Each		2033	$441
			Replace Ballast & Lamps Fluorescent Lighting Fixture, T12, 40 W	22	Each		2033	$1,540
			Repair Wiring Device, Switch	92	Each		2033	$2,188
			Repair Wiring Device, Switch	6	Each		2033	$143
			Repair Circuit Breaker, 15/20 Amp. - JE	46	Each		2033	$358
			Repair Circuit Breaker, 3 Ph., 600 V, 100 Amp	2	Each		2033	$881
			Repair Circuit Breaker, 3 Ph., 600 V, 60 Amp	4	Each		2033	$1,763
			Repair Circuit Breaker, 3 Ph., 600 V, 60 Amp	17	Each		2033	$7,492
			Repair Circuit Breaker, 600 V, 400 Amp	2	Each		2033	$881
			Repair Circuit Breaker, 600 V, 400 Amp	1	Each		2033	$441
			Replace Ballast & Lamps Fluorescent Lighting Fixture, T12, 40 W	8	Each		2033	$560
			Replace Ballast & Lamp High Pressure Sodium Lighting Fixture, 250 W	1	Each		2033	$239
	Link		Replace Ballast Metal Halide Lighting Fixture, Wall Mount, 150 W	1	Each		2033	$146
	Courtyard		Repair Circuit Breaker, 3 Ph., 600 V, 100 Amp	6	Each		2033	$2,644

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - Base Building	Courtyard		Repair Circuit Breaker, 600 V, 400 Amp	8	Each		2033	$3,526
	Courtyard		Repair Circuit Breaker, Main, 208 Y, 120 V, 1,200 Amp	1	Each		2033	$534
	Courtyard	T1	Repair Secondary Transformer, Dry, 150 kVA	1	Each		2033	$319
			Repair Circuit Breaker, 600 V, 400 Amp	1	Each		2033	$441
			Replace Ballast & Lamp Compact Fluorescent Lighting Fixture, Digital Addressable Ballast, 32 W	12	Each		2033	$2,217
			Replace Ballast & Lamps Fluorescent Lighting Fixture, T8, 25 W	23	Each		2033	$1,624
			Replace Ballast & Lamps Fluorescent Lighting Fixture, T8, 32 W	78	Each		2033	$6,190
			Repair Circuit Breaker, 15/20 Amp. - JE	68	Each		2033	$530
			Repair Circuit Breaker, 3 Ph., 600 V, 100 Amp	3	Each		2033	$1,322
			Repair Circuit Breaker, 3 Ph., 600 V, 60 Amp	2	Each		2033	$881
		P1, P3	Repair Power Panel Board, 208 Y, 120 V, 225 Amp	2	Each		2033	$137
TUL - EG Building			Repair Circuit Breaker, 15/20 Amp. - JE	25	Each		2033	$195
			Repair Circuit Breaker, 3 Ph., 600 V, 100 Amp	2	Each		2033	$881
			Repair Circuit Breaker, 3 Ph., 600 V, 60 Amp	3	Each		2033	$1,322
			Repair Circuit Breaker, 600 V, 400 Amp	7	Each		2033	$3,085
		MDPC, MDPE	Repair Power Panel Board, 208 Y, 120 V, 800 Amp	2	Each		2033	$137
			Repair Wiring Device, Switch	7	Each		2033	$166
			Replace Ballast & Lamps Fluorescent Lighting Fixture, T12, 40 W	12	Each		2033	$840
			Replace Ballast & Lamps Fluorescent Lighting Fixture, T12, 60 W	3	Each		2033	$224

Project Builder Detail

JACOBS

Project Name: Replace Electrical Systems
Project Number: 023B-TUL
Project Type: Sustainment
Completion Year: 2033
Fund Type: F&E
Frequency: One Time
Estimate Cost: $382,095

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - ATCT			Replace Circuit Breaker, 15/20 Amp. - JE	3	Each		2027	$90
			Replace Circuit Breaker, 3 Ph., 600 V, 60 Amp	7	Each		2027	$8,419
	Junction Level	AHU 1 & 2 Panel	Replace Power Panel Board, 208 Y, 120 V, 100 Amp	1	Each		2027	$3,809
	Seventh Floor	Back-up A/Cs	Replace Power Panel Board, 208 Y, 120 V, 100 Amp	1	Each		2027	$3,809
			Replace Grounded Fault Circuit Interrupter, 15 Amp	2	Each		2034	$115
			Replace Circuit Breaker, 15/20 Amp. - JE	22	Each		2034	$659
			Replace Circuit Breaker, 3 Ph., 600 V, 100 Amp	1	Each		2034	$1,327
			Replace Circuit Breaker, 3 Ph., 600 V, 100 Amp	1	Each		2034	$1,327
			Replace Circuit Breaker, 3 Ph., 600 V, 60 Amp	1	Each		2034	$1,203
	Ninth Floor	P9A	Replace Power Panel Board, 208 Y, 120 V, 100 Amp	1	Each		2034	$3,809
	Cab	P10	Replace Power Panel Board, 208 Y, 120 V, 100 Amp	1	Each		2034	$3,809
	Eighth Floor	T4	Replace Secondary Transformer, Dry, 15 kVA	1	Each		2034	$3,605
	Grade	T7	Replace Secondary Transformer, Dry, 150 kVA	1	Each		2034	$11,859

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - ATCT	Junction Level	T6	Replace Secondary Transformer, Dry, 30 kVA	1	Each		2034	$4,569
	Eighth Floor	T5	Replace Secondary Transformer, Dry, 30 kVA	1	Each		2034	$4,569
	Seventh Floor	T3	Replace Secondary Transformer, Dry, 30 kVA	1	Each		2034	$4,569
			Replace Transient Voltage Surge Suppression Panel	4	Each		2034	$2,410
			Replace LED Lighting Fixture, Basic, 20 W	1	Each		2036	$143
TUL - Base Building			Replace Circuit Breaker, 15/20 Amp. - JE	20	Each		2028	$599
		MCIE	Replace Power Panel Board, 208 Y, 120 V, 100 Amp	1	Each		2028	$3,809
		MCIC	Replace Power Panel Board, 208 Y, 120 V, 225 Amp	1	Each		2028	$6,146
			Replace Grounded Fault Circuit Interrupter, 15 Amp	3	Each		2030	$173
			Replace Circuit Breaker, 15/20 Amp. - JE	151	Each		2034	$4,522
			Replace Circuit Breaker, 3 Ph., 600 V, 100 Amp	17	Each		2034	$22,552
			Replace Circuit Breaker, 3 Ph., 600 V, 60 Amp	13	Each		2034	$15,636
			Replace Circuit Breaker, 600 V, 400 Amp	10	Each		2034	$42,742
		KLPN, P5	Replace Power Panel Board, 208 Y, 120 V, 100 Amp	2	Each		2034	$7,618
		CAB5	Replace Power Panel Board, 208 Y, 120 V, 100 Amp	1	Each		2034	$3,809
		KPPN	Replace Power Panel Board, 208 Y, 120 V, 200 Amp	1	Each		2034	$5,199
		CLPB1, CLPB2, ELPB-1	Replace Power Panel Board, 208 Y, 120 V, 225 Amp	3	Each		2034	$18,439
		CCP, EPP	Replace Power Panel Board, 208 Y, 120 V, 400 Amp	2	Each		2034	$14,588
		EHPB-1	Replace Power Panel Board, 480 Y, 277 V, 200 Amp	1	Each		2034	$6,861
			Replace Transient Voltage Surge Suppression Panel	1	Each		2034	$603

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - Base Building			Replace LED Lighting Fixture, Basic, 11 W	2	Each		2036	$286
			Replace Disconnect Switch, 200 Amp	2	Each		2039	$2,967
TUL - EG Building			Replace Circuit Breaker, 3 Ph., 600 V, 100 Amp	2	Each		2032	$2,653
			Replace Circuit Breaker, 600 V, 400 Amp	6	Each		2032	$25,645
		UPS Bypass Panelboard	Replace Power Panel Board, 208 Y, 120 V, 400 Amp	1	Each		2032	$7,294
		UPS1	Replace Power Panel Board, 208 Y, 120 V, 400 Amp	1	Each		2032	$7,294
			Replace Circuit Breaker, 3 Ph., 600 V, 100 Amp	1	Each		2034	$1,327
			Replace Circuit Breaker, 3 Ph., 600 V, 100 Amp	3	Each		2034	$3,980
			Replace Circuit Breaker, 3 Ph., 600 V, 60 Amp	2	Each		2034	$2,406
			Replace Circuit Breaker, 600 V, 400 Amp	1	Each		2034	$4,274
			Replace Circuit Breaker, 600 V, 400 Amp	9	Each		2034	$38,468
			Replace Circuit Breaker, Main, 208 Y, 120 V, 600 Amp	2	Each		2034	$18,721
			Replace Circuit Breaker, Main, 208 Y, 120 V, 800 Amp	1	Each		2034	$9,882
		MDPEH Sec 1, Sec 2	Replace Power Panel Board, 480 Y, 277 V, 600 Amp	2	Each		2034	$19,421
		MDPNH	Replace Power Panel Board, 480 Y, 277 V, 800 Amp	1	Each		2034	$11,017
	Site	T-2	Replace Secondary Transformer, Dry, 150 kVA	1	Each		2034	$11,859
			Replace Transient Voltage Surge Suppression Panel	2	Each		2034	$1,205

Project Builder Detail

JACOBS

Project Name: Replace Central Vacuum
Project Number: 024-TUL
Project Type: Sustainment
Completion Year: 2034
Fund Type: OPS
Frequency: One Time
Estimate Cost: $3,602

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - ATCT	Junction Level	CV-T1	Replace Central Vacuum System - JE	1	Each		2034	$3,602

Project Builder Detail

JACOBS

Project Name: Site Improvements
Project Number: 025-TUL
Project Type: Sustainment
Completion Year: 2034
Fund Type: F&E
Frequency: One Time
Estimate Cost: $62,614

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - Base Building	Site		Replace Sliding Gate, Motor Operated	1	Each		2024	$4,853
	Site		Replace Chain Link Fence, 8 Ln Ft	1,050	LnFt		2034	$54,744
	Site		Replace Concrete Base Outdoor Pole Light - JE	1	Each		2039	$380
	Site		Replace Outdoor Pole Light - JE	1	Each		2039	$2,637

Project Builder Detail

JACOBS

Project Name: Replace Roofing
Project Number: 026-TUL
Project Type: Sustainment
Completion Year: 2036
Fund Type: F&E
Frequency: One Time
Estimate Cost: $110,998

Building Name	Location	Equipment ID	Task	Quantity	Units	Deferred	Task Year	Task Cost
TUL - Base Building			Replace Flashing - JE	467	LnFt		2036	$1,217
			Replace Flashing - JE	36	LnFt		2036	$94
			Replace Single-Ply PVC Membrane Roof - JE	9,900	SqFt		2036	$97,798
	Link		Replace Single-Ply PVC Membrane Roof - JE	72	SqFt		2036	$705
			Replace Roof Drain, 6.00 In	4	Each		2036	$1,942
TUL - EG Building			Replace Steel Roof Access Ladder	13	LnFt		2036	$1,102
			Replace Flashing - JE	118	LnFt		2036	$308
			Replace Single-Ply PVC Membrane Roof - JE	800	SqFt		2036	$7,832

APPENDIX E: CONDITION ASSESSMENT REPORT ROM CONSTRUCTION ESTIMATES – ATCT, BASE BUILDING, AND E/G BUILDING

FAA TUL ATCT - CA ESTIMATE

Tulsa, OK

Condition Assessment Estimate Report

Project name	**FAA TUL ATCT - CA EST** **Tulsa** **OK** ***USA***
Client	FAA
Architect	Jacobs GBNA
Engineer	Jacobs GBNA
Estimator	**Frank Jenkins**
Labor rate table	****US-30CITYAVG-161-L**
Equipment rate table	****US-30CITYAVG-151-E**
Project	202014
Estimate Date	02/18/2020
JEG Project No.	FCWC5915
Definable field 03	TUL015
Definable field 04	REV-01
Estimate No.	202014
Report format	*Sorted by 'Open 2/Func Area1/Area/Group phase/Phase'* *'Detail' summary* *Allocate addons*
Cost index	*Oklahoma-Tulsa*

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
01 ATCT									
01 Architectural									
A001									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	0.75 hr	72.48 /hr	54	-	-	-	72.48 /hr	54	
			54					*54*	
General Requirements		***/ls***	***54***	***/ls***			***/ls***	***54***	
100000.00 Specialties									
101419.10 Signs									
Max. Occupancy Sign	1.00 ea	238.11 /ea	238	563.79 /ea	564	12	813.47 /ea	813	
Signs			***238***		***564***	***12***		***813***	
Specialties		***/ls***	***238***	***/ls***	***564***	***12***	***/ls***	***813***	
A001		***/ls***	***292***	***/ls***	***564***	***12***	***/ls***	***868***	
A005									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	36.65 hr	72.48 /hr	2,656	-	-	-	72.48 /hr	2,656	
			2,656					*2,656*	
General Requirements		***/ls***	***2,656***	***/ls***			***/ls***	***2,656***	
060000.00 Wood, Plastics, and Composites									
060523.80 Metal Bracing									
Door Opening, secure frame to existing CMU wall	4.00 ea	1,110.00 /ea	4,440	697.88 /ea	2,792	-	1,807.88 /ea	7,232	
Metal Bracing			***4,440***		***2,792***			***7,232***	
Wood, Plastics, and Composites		***/****	***4,440***	***/****	***2,792***		***/****	***7,232***	
080000.00 Openings									
081213.13 Standard Hollow Metal Frames									
Steel frames knock down, 14 ga, "B" label, 5.75" D, 7' H, 3'-6" W, sgl	4.00 ea	169.35 /ea	677	418.67 /ea	1,675	-	588.01 /ea	2,352	
Standard Hollow Metal Frames			***677***		***1,675***			***2,352***	
081313.15 Metal Doors									
Fire door, st, fl, "B" lbl, 90 min, full pnl, 18 Ga., 3'-6" x 7'-0"	4.00 ea	158.75 /ea	635	1,094.07 /ea	4,376	-	1,252.82 /ea	5,011	
Metal Doors			***635***		***4,376***			***5,011***	
087120.15 Hardware									
Average, door hardware set, Single, "B" label, U.L. Listed, Fire Rated	4.00 door	412.76 /door	1,651	1,107.75 /door	4,431	-	1,520.51 /door	6,082	
Hardware			***1,651***		***4,431***			***6,082***	
087120.31 Door Closers									
Door closer, electro magnetic, closer/holder, single point, detector	4.00 ea	476.27 /ea	1,905	898.46 /ea	3,594	-	1,374.73 /ea	5,499	
Door Closers			***1,905***		***3,594***			***5,499***	
087120.65 Thresholds									

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
087120.65 Thresholds									
Thresholds, aluminum, saddle-type,3'-6" long x 8" wide x 1/2" thick, ADA compliant	4.00 ea	158.74 /ea	635	139.26 /ea	557	-	298.00 /ea	1,192	
Thresholds			*635*		*557*			*1,192*	
087120.90 Hinges									
Hinges, full mortise, hi frequency, SS base, 4-1/2" x 4-1/2", us32	6.00 pr	-	-	269.77 /pr	1,619	-	269.77 /pr	1,619	
Hinges					*1,619*			*1,619*	
087530.10 Smoke & Weather Seals									
Weatherstripping, doors, met FR, extruded sections, 3' x 7' door,	4.00 opng	238.13 /opng	953	132.19 /opng	529	-	370.32 /opng	1,481	
Smoke & Weather Seals			*953*		*529*			*1,481*	
Openings		*/ls*	*6,456*	*/ls*	*16,780*		*/ls*	*23,236*	
090000.00 Finishes									
099123.35 Doors & Windows									
Prepare, Prime and Paint Wood or Metal Doors and Frames	250.00 sf	9.44 /sf	2,360	0.32 /sf	79	-	9.76 /sf	2,439	
Doors & Windows			*2,360*		*79*			*2,439*	
Finishes		*/ls*	*2,360*	*/ls*	*79*		*/ls*	*2,439*	
280000.00 Electronic Safety and Security									
281616.50 Detection Devices									
Detection systems, door holder, electro-magnetic, tie into FA system	4.00 ea	360.50 /ea	1,442	178.26 /ea	713	-	538.76 /ea	2,155	
Detection Devices			*1,442*		*713*			*2,155*	
Electronic Safety and Security		*/ls*	*1,442*	*/ls*	*713*		*/ls*	*2,155*	
A005		*/ls*	*17,355*	*/ls*	*20,364*		*/ls*	*37,719*	
A006									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	5.00 hr	72.48 /hr	362	-	-	-	72.48 /hr	362	
			362					*362*	
General Requirements		*/ls*	*362*	*/ls*			*/ls*	*362*	
270000.00 Communications									
275119.10 Paging System									
Cornell rescue assistance 4200 panel	1.00 ea	720.97 /ea	721	4,298.07 /ea	4,298	-	5,019.04 /ea	5,019	
Cornell rescue assistance 4200 call station	3.00 ea	360.51 /ea	1,082	567.59 /ea	1,703	-	928.10 /ea	2,784	
Paging System			*1,802*		*6,001*			*7,803*	
Communications			*1,802*		*6,001*			*7,803*	
A006		*/ls*	*2,165*	*/ls*	*6,001*		*/ls*	*8,166*	
A007									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	10.61 hr	72.48 /hr	769	-	-	-	72.48 /hr	769	
			769					*769*	

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
General Requirements		/ls	769	/ls			/ls	769	
080000.00 Openings									
080505.10 Selective Demolition									
Remove Door Hardware	3.00 ea	169.67 /ea	509	-	-	-	169.67 /ea	509	
Selective Demolition			509					509	
087120.15 Hardware									
Auto-Lock, door latch hardware set, interior, U.L. Listed	2.00 door	476.26 /door	953	1,184.78 /door	2,370	-	1,661.04 /door	3,322	
Average, door hardware set, Double, UL Listed	1.00 pr	509.59 /pr	510	1,811.39 /pr	1,811	-	2,320.98 /pr	2,321	
Hardware			1,462		4,181			5,643	
087120.31 Door Closers									
Door closer, DEMO	4.00 ea	79.39 /ea	318			-	79.39 /ea	318	
Door Closer, surface mounted, heavy duty, fusible link arm	4.00 ea	238.13 /ea	953	518.54 /ea	2,074	-	756.66 /ea	3,027	
Door Closers			1,270		2,074			3,344	
Openings		/ls	3,241	/ls	6,255		/ls	9,496	
A007		/ls	4,010	/ls	6,255		/ls	10,265	
A008									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	6.00 hr	72.48 /hr	435	-	-	-	72.48 /hr	435	
			435					435	
General Requirements		/ls	435	/ls			/ls	435	
080000.00 Openings									
081313.15 Metal Doors									
Re-Inspect Fire Door and frame, provide new Label	6.00 ea	317.51 /ea	1,905	9.83 /ea	59	-	327.34 /ea	1,964	
Metal Doors			1,905		59			1,964	
Openings		/ls	1,905	/ls	59		/ls	1,964	
A008		/ls	2,340	/ls	59		/ls	2,399	
A009									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	10.00 hr	72.48 /hr	725	-	-	-	72.48 /hr	725	
			725					725	
General Requirements		/ls	725	/ls			/ls	725	
070000.00 Thermal and Moisture Protection									
078413.10 Firestopping									
Firestopping, Wall Opening	20.00 ea	158.75 /ea	3,175	16.88 /ea	338	-	175.63 /ea	3,513	
Firestopping			3,175		338			3,513	
Thermal and Moisture Protection		/ls	3,175	/ls	338		/ls	3,513	
A009		/ls	3,900	/ls	338		/ls	4,237	
A010									
010000.00 General Requirements									
013113.20									

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
013113.20									
Field personnel, misc labor, cleanup	0.75 hr	72.47 /hr	54	-	-	-	72.47 /hr	54	
			54					*54*	
General Requirements		*/ls*	*54*	*/ls*			*/ls*	*54*	
070000.00 Thermal and Moisture Protection									
078413.10 Firestopping									
Firestopping, constr jt, wall joints, 1" wide	5.00 lf	23.81 /lf	119	15.85 /lf	79	-	39.67 /lf	198	
Firestopping			*119*		*79*			*198*	
Thermal and Moisture Protection		*/ls*	*119*	*/ls*	*79*		*/ls*	*198*	
090000.00 Finishes									
092116.33 Partition Wall									
Ptn wl,5/8",gyp drwl,tape,fres,2lyr,2hr,met std,NLB,25Ga,16"oc,3-5/8"w	5.00 sf	23.81 /sf	119	4.51 /sf	23	-	28.33 /sf	142	
Partition Wall			*119*		*23*			*142*	
Finishes		*/ls*	*119*	*/ls*	*23*		*/ls*	*142*	
A010		*/ls*	*292*	*/ls*	*102*		*/ls*	*394*	
A011									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	3.05 hr	72.49 /hr	221	-	-	-	72.49 /hr	221	
			221					*221*	
General Requirements		*/ls*	*221*	*/ls*			*/ls*	*221*	
230000.00 HVAC Components									
230505.10 Mech Labor									
Modify Duct to accept new damper	1.00 ea	190.68 /ea	191	-	-	-	190.68 /ea	191	
Mech Labor			*191*					*191*	
233113.19 Metal Duct Fittings									
Duct accessories, fire/smoke comb damper, louver type, UL, 16" x 48"	1.00 ea	270.60 /ea	271	774.27 /ea	774	-	1,044.87 /ea	1,045	
Metal Duct Fittings			*271*		*774*			*1,045*	
HVAC Components		*/ls*	*461*	*/ls*	*774*		*/ls*	*1,236*	
28-00-00.00 ELECTRONIC SAFETY AND SECURITY									
28-01-30.51 Maint. And Admin. Of Elec. Detection And Alarm									
Fire alarm device, connect New to FACP, duct damper	1.00 ea	542.91 /ea	543	268.51 /ea	269	-	811.42 /ea	811	
Maint. And Admin. Of Elec. Detection And Alarm			*543*		*269*			*811*	
ELECTRONIC SAFETY AND SECURITY		*/ls*	*543*	*/ls*	*269*		*/ls*	*811*	
A011		*/ls*	*1,225*	*/ls*	*1,043*		*/ls*	*2,268*	
A012									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	3.05 hr	72.48 /hr	221	-	-	-	72.48 /hr	221	
			221					*221*	

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
General Requirements		*/ls*	*221*	*/ls*			*/ls*	*221*	
230000.00 HVAC Components									
230505.10 Mech Labor									
Modify Duct to accept new damper	1.00 ea	190.70 /ea	191	-	-	-	190.70 /ea	191	
Mech Labor			*191*					*191*	
233113.19 Metal Duct Fittings									
Duct accessories, fire/smoke comb damper, louver type, UL, 48" x 36"	1.00 ea	270.60 /ea	271	774.26 /ea	774	-	1,044.86 /ea	1,045	
Metal Duct Fittings			*271*		*774*			*1,045*	
HVAC Components		*/ls*	*461*	*/ls*	*774*		*/ls*	*1,236*	
28-00-00.00 ELECTRONIC SAFETY AND SECURITY									
28-01-30.51 Maint. And Admin. Of Elec. Detection And Alarm									
Fire alarm device, connect New to FACP, duct damper	1.00 ea	542.90 /ea	543	268.52 /ea	269	-	811.42 /ea	811	
Maint. And Admin. Of Elec. Detection And Alarm			*543*		*269*			*811*	
ELECTRONIC SAFETY AND SECURITY		*/ls*	*543*	*/ls*	*269*		*/ls*	*811*	
A012		***/ls***	***1,225***	***/ls***	***1,043***		***/ls***	***2,268***	
A013									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	6.43 hr	72.48 /hr	466	-	-	-	72.48 /hr	466	
			466					*466*	
General Requirements		*/ls*	*466*	*/ls*			*/ls*	*466*	
080000.00 Openings									
080505.10 Selective Demolition									
Remove Door Hardware	3.00 ea	169.67 /ea	509	-	-	-	169.67 /ea	509	
Selective Demolition			*509*					*509*	
087120.15 Hardware									
Average, door hardware set, Single Exterior, "B" label, U.L. Listed, Fire Rated	3.00 door	412.75 /door	1,238	1,107.75 /door	3,323	-	1,520.50 /door	4,562	
Hardware			*1,238*		*3,323*			*4,562*	
Openings		*/ls*	*1,747*	*/ls*	*3,323*		*/ls*	*5,071*	
090000.00 Finishes									
099123.35 Doors & Windows									
Prepare, Prime and Paint Wood or Metal Doors and Frames	15.00 sf	9.44 /sf	142	0.32 /sf	5	-	9.76 /sf	146	
Doors & Windows			*142*		*5*			*146*	
Finishes		*/ls*	*142*	*/ls*	*5*		*/ls*	*146*	
A013		***/ls***	***2,355***	***/ls***	***3,328***		***/ls***	***5,683***	
A014									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	1.43 hr	72.48 /hr	104	-	-	-	72.48 /hr	104	
			104					*104*	

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
General Requirements		/ls	*104*	/ls			/ls	*104*	
090000.00 Finishes									
099123.35 Doors & Windows									
Prepare, Prime and Paint Wood or Metal Doors and Frames	5.00 sf	9.44 /sf	47	0.32 /sf	2	-	9.76 /sf	49	
Doors & Windows			*47*		*2*			*49*	
Finishes		/ls	*47*	/ls	*2*		/ls	*49*	
08-13-13.00 Hollow Metal Doors									
08-81-30.10 Reduce Heat Transfer Glass									
Insulating Glass, 1-lite, B-label 1-1/2 hr fire-rated glass, 1/4" float, 1/2" thick, fire door lite kit (10" x 10") - DEMO	1.00 ea	106.73 /ea	107			-	106.73 /ea	107	
Insulating Glass, 1-lite, B-label 1-1/2 hr fire-rated glass, 1/4" float, 1/2" thick, fire door lite kit (10" x 10")	1.00 ea	160.13 /ea	160	139.97 /ea	140	-	300.10 /ea	300	
Reduce Heat Transfer Glass			*267*		*140*			*407*	
Hollow Metal Doors			*267*		*140*			*407*	
A014		/ls	***418***	/ls	***142***		/ls	***559***	
A016									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	5.27 hr	72.47 /hr	382	-	-	-	72.47 /hr	382	
			382					*382*	
General Requirements		/ls	*382*	/ls			/ls	*382*	
050000.00 Metals									
050505.10 Selective Metals Demolition									
Remove Metal Wall Handrail	18.00 lf	10.38 /lf	187	-	-	-	10.38 /lf	187	
Selective Metals Demolition			*187*					*187*	
055213.50 Railings, Pipe									
Handrail Wall Bracket, steel, includes attachment to CMU wall	8.00 ea	93.58 /ea	749	42.83 /ea	343		136.41 /ea	1,091	D
Railing, wall rail, steel pipe, 1-1/4" square, galvanized	25.00 lf	28.12 /lf	703	45.56 /lf	1,139	39	75.25 /lf	1,881	D
Railings, Pipe			*1,452*		*1,482*	*39*		*2,973*	
Metals		/ls	*1,638*	/ls	*1,482*	*39*	/ls	*3,159*	
090000.00 Finishes									
099123.75 Misc. Painting									
Prepare, Prime & Paint Handrail/Guardrail	25.00 lf	9.36 /lf	234	3.18 /lf	80	-	12.54 /lf	314	
Misc. Painting			*234*		*80*			*314*	
Finishes		/ls	*234*	/ls	*80*		/ls	*314*	
A016		/ls	***2,254***	/ls	***1,561***	***39***	/ls	***3,855***	
A017									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	1.41 hr	72.49 /hr	102	-	-	-	72.49 /hr	102	

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
			102					*102*	
General Requirements		*/ls*	*102*	*/ls*			*/ls*	*102*	
090000.00 Finishes									
097223.10 Wallpaper									
Wall covering, vinyl, fabric-backed, mdm weight, type 2,(20-24oz/SY)	20.00 sf	8.61 /sf	172	1.71 /sf	34	-	10.31 /sf	206	
Wallpaper			*172*		*34*			*206*	
099113.90 Walls, Masonry (CMU) or Concrete									
Patch & Paint, walls, masonry, CMU	2.00 sf	2.95 /sf	6	0.90 /sf	2	-	3.85 /sf	8	
Walls, Masonry (CMU) or Concrete			*6*		*2*			*8*	
Finishes		*/ls*	*178*	*/ls*	*36*		*/ls*	*214*	
220000.00 Plumbing									
220505.10 Plumbing Labor									
Plumbing dml, piping, metal, up thru 1-1/2" dia	2.00 lf	7.80 /lf	16	-	-	-	7.80 /lf	16	
Plumbing Labor			*16*					*16*	
220719.10 Piping Insulation									
Insulation, pipe coving, fbgl, W/all svce jkt, 1/2" wl, 1-1/2" IPS	4.00 lf	5.01 /lf	20	3.11 /lf	12	-	8.11 /lf	32	
Piping Insulation			*20*		*12*			*32*	
221113.74 Pipe, Plastic - Flex Connections									
Pipe,PVC hi imp/press, sch 80,1-1/2" dia incld fittings and hangers	4.00 lf	55.03 /lf	220	9.53 /lf	38	-	64.55 /lf	258	
Pipe, Plastic - Flex Connections			*220*		*38*			*258*	
Plumbing		*/ls*	*256*	*/ls*	*51*		*/ls*	*306*	
A017		***/ls***	***536***	***/ls***	***86***		***/ls***	***622***	
A018									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	3.00 hr	72.47 /hr	217	-	-	-	72.47 /hr	217	
			217					*217*	
General Requirements		*/ls*	*217*	*/ls*			*/ls*	*217*	
050000.00 Metals									
051516.50 Gates									
Stair Gate - 3' 0" w x 3' 6" h, perf mtl panel infill, self closing hinges, 1-1/4" dia. SS framed	1.00 ea	748.63 /ea	749	837.78 /ea	838	-	1,586.41 /ea	1,586	
Stair Gate - attaching panel to SS Frame	1.00 ea	374.31 /ea	374			-	374.31 /ea	374	
Gates			*1,123*		*838*			*1,961*	
Metals		*/ls*	*1,123*	*/ls*	*838*		*/ls*	*1,961*	
A018		***/ls***	***1,340***	***/ls***	***838***		***/ls***	***2,178***	
A020									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	66.00 hr	72.48 /hr	4,784	-	-	-	72.48 /hr	4,784	

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
			4,784					*4,784*	
General Requirements		*/ls*	*4,784*	*/ls*			*/ls*	*4,784*	
050000.00 Metals									
055513.50 Stairs & Landings									
Stair Riser Plates, anodized aluminum, perf, 7" x 40"	165.00 ea	56.15 /ea	9,264	71.72 /ea	11,834	1,375	136.20 /ea	22,473	
Stair Riser Plate Attachment Brackets, anodized aluminum, each	660.00 ea	23.40 /ea	15,441	15.83 /ea	10,445	1,741	41.86 /ea	27,626	
Stairs & Landings			*24,705*		*22,278*	*3,116*		*50,099*	
Metals		*/ls*	*24,705*	*/ls*	*22,278*	*3,116*	*/ls*	*50,099*	
A020		***/ls***	***29,489***	***/ls***	***22,278***	***3,116***	***/ls***	***54,883***	
A021									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	114.40 hr	72.48 /hr	8,292	-	-	-	72.48 /hr	8,292	
			8,292					*8,292*	
General Requirements		*/ls*	*8,292*	*/ls*			*/ls*	*8,292*	
050000.00 Metals									
057323.50 Metal Railing									
Railing, 1 1/4" square, galv stl, w/8" h posts welded to existing rail	260.00 lf	108.19 /lf	28,129	52.65 /lf	13,688	2,002	168.54 /lf	43,819	
Metal Railing			*28,129*		*13,688*	*2,002*		*43,819*	
Metals		*/ls*	*28,129*	*/ls*	*13,688*	*2,002*	*/ls*	*43,819*	
090000.00 Finishes									
099123.75 Misc. Painting									
Prepare, Prime & Paint Handrail/Guardrail	1,040.00 lf	9.36 /lf	9,736	3.18 /lf	3,309	-	12.54 /lf	13,045	
Misc. Painting			*9,736*		*3,309*			*13,045*	
Finishes		*/ls*	*9,736*	*/ls*	*3,309*		*/ls*	*13,045*	
A021		***/ls***	***46,156***	***/ls***	***16,997***	***2,002***	***/ls***	***65,155***	
A022									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	55.75 hr	72.48 /hr	4,041	-	-	-	72.48 /hr	4,041	
			4,041					*4,041*	
General Requirements		*/ls*	*4,041*	*/ls*			*/ls*	*4,041*	
050000.00 Metals									
050505.10 Selective Metals Demolition									
Remove Metal Wall Handrail	282.00 lf	10.38 /lf	2,927	-	-	-	10.38 /lf	2,927	D
Selective Metals Demolition			*2,927*					*2,927*	
055213.50 Railings, Pipe									
Handrail Wall Bracket, steel, includes attachment to CMU wall	54.00 ea	93.58 /ea	5,053	42.83 /ea	2,313		136.41 /ea	7,366	D

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
055213.50 Railings, Pipe									
Railing, wall rail, steel pipe, 1-1/4" square, galvanized	310.00 lf	28.12 /lf	8,716	45.56 /lf	14,125	486	75.25 /lf	23,327	D
Railings, Pipe			*13,770*		*16,438*	*486*		*30,694*	
Metals		*/ls*	*16,696*	*/ls*	*16,438*	*486*	*/ls*	*33,620*	
090000.00 Finishes									
099123.75 Misc. Painting									
Prepare, Prime & Paint Handrail/Guardrail	310.00 lf	9.36 /lf	2,902	3.18 /lf	986	-	12.54 /lf	3,888	
Misc. Painting			*2,902*		*986*			*3,888*	
Finishes		*/ls*	*2,902*	*/ls*	*986*		*/ls*	*3,888*	
A022		*/ls*	*23,639*	*/ls*	*17,424*	*486*	*/ls*	*41,549*	
A023									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	2.39 hr	72.49 /hr	173	-	-	-	72.49 /hr	173	
			173					*173*	
General Requirements		*/ls*	*173*	*/ls*			*/ls*	*173*	
260000.00 Electrical									
260519.90 Wire									
Wire, 600 volt, type THW, copper, stranded, #12 - power	0.90 clf	131.09 /clf	118	40.49 /clf	36	-	171.58 /clf	154	
Wire			*118*		*36*			*154*	
260533.10 Conduit									
Conduit to 15' H, incl couplings only, elec metallic tubing, 1/2" dia - power	30.00 lf	3.32 /lf	99	1.19 /lf	36	-	4.51 /lf	135	
Conduit			*99*		*36*			*135*	
265313.10 Exit Lighting									
Exit & emer ltg, exit light clg or wall mount, L.E.D. std. double face	3.00 ea	215.22 /ea	646	158.71 /ea	476	-	373.93 /ea	1,122	
Exit Lighting			*646*		*476*			*1,122*	
Electrical		*/ls*	*863*	*/ls*	*548*		*/ls*	*1,411*	
A023		*/ls*	*1,036*	*/ls*	*548*		*/ls*	*1,585*	
A024									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	1.80 hr	72.49 /hr	130	-	-	-	72.49 /hr	130	
			130					*130*	
General Requirements		*/ls*	*130*	*/ls*			*/ls*	*130*	
260000.00 Electrical									
260519.90 Wire									
Wire, 600 volt, type THW, copper, stranded, #12 - power	0.90 clf	131.08 /clf	118	40.49 /clf	36	-	171.57 /clf	154	
Wire			*118*		*36*			*154*	
260533.10 Conduit									

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
260533.10 Conduit									
Conduit to 15' H, incl couplings only, elec metallic tubing, 1/2" dia - power	30.00 lf	3.31 /lf	99	1.19 /lf	36	-	4.51 /lf	135	
Conduit			*99*		*36*			*135*	
265313.10 Exit Lighting									
Exit & emer ltg, exit light clg or wall mount, L.E.D. std. double face	2.00 ea	215.22 /ea	430	158.70 /ea	317	-	373.92 /ea	748	
Exit Lighting			*430*		*317*			*748*	
Electrical		*/ls*	*648*	*/ls*	*390*		*/ls*	*1,038*	
A024		***/ls***	***778***	***/ls***	***390***		***/ls***	***1,168***	
A025									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	6.60 hr	72.48 /hr	478	-	-	-	72.48 /hr	478	
			478					*478*	
General Requirements		*/ls*	*478*	*/ls*			*/ls*	*478*	
080000.00 Openings									
087120.40 Lockset									
Remove & Replace Door Knobs with Lever Handles w/Tactile warning - ADA	11.00 ea	190.50 /ea	2,096	253.18 /ea	2,785	-	443.68 /ea	4,880	
Lockset			*2,096*		*2,785*			*4,880*	
Openings		*/ls*	*2,096*	*/ls*	*2,785*		*/ls*	*4,880*	
A025		***/ls***	***2,574***	***/ls***	***2,785***		***/ls***	***5,359***	
A026									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	5.00 hr	72.48 /hr	362	-	-	-	72.48 /hr	362	
			362					*362*	
General Requirements		*/ls*	*362*	*/ls*			*/ls*	*362*	
080000.00 Openings									
087120.40 Lockset									
Remove & Replace Door Knobs with Lever Handles - ADA	10.00 ea	158.75 /ea	1,588	208.85 /ea	2,088	-	367.60 /ea	3,676	
Lockset			*1,588*		*2,088*			*3,676*	
Openings		*/ls*	*1,588*	*/ls*	*2,088*		*/ls*	*3,676*	
A026		***/ls***	***1,950***	***/ls***	***2,088***		***/ls***	***4,038***	
A028									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	19.51 hr	72.48 /hr	1,414	-	-	-	72.48 /hr	1,414	
			1,414					*1,414*	
General Requirements		*/ls*	*1,414*	*/ls*			*/ls*	*1,414*	
060000.00 Wood, Plastics, and Composites									

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
060505.20 Demolition									
Remove FRP Wall Panels	80.00 sf	10.17 /sf	814	-	-	-	10.17 /sf	814	
Demolition			*814*					*814*	
Wood, Plastics, and Composites		*/****	*814*	*/****			*/****	*814*	
090000.00 Finishes									
090505.20 Selective Demolition									
Flooring demo, Vinyl Floor Tiles	25.00 sf	6.36 /sf	159	-	-	-	6.36 /sf	159	
Selective Demolition			*159*					*159*	
093013.10 Ceramic Tile									
Ceramic tile, floors,glazed, thin set, 8" x 8", color group 1	25.00 sf	7.95 /sf	199	8.30 /sf	207	-	16.25 /sf	406	
Ceramic tile, walls, interior, thin set, 6" x 6" tile	80.00 sf	9.94 /sf	795	7.36 /sf	589	-	17.30 /sf	1,384	
Ceramic tile, regrout tile floor	25.00 sf	8.92 /sf	223	0.37 /sf	9	-	9.29 /sf	232	
Ceramic tile, regrout tile wall	80.00 sf	8.92 /sf	713	0.37 /sf	30	-	9.29 /sf	743	
Ceramic Tile			*1,930*		*835*			*2,765*	
099123.72 Walls And Ceilings									
Prepare, Prime and Paint GWB Walls	80.00 sf	5.02 /sf	401	0.72 /sf	57	-	5.73 /sf	459	
Patch & Paint Gypsum Board Ceiling	25.00 sf	8.02 /sf	201	2.55 /sf	64	5	10.79 /sf	270	
Walls And Ceilings			*602*		*121*	*5*		*728*	
Finishes		*/ls*	*2,691*	*/ls*	*956*	*5*	*/ls*	*3,653*	
100000.00 Specialties									
102813.13 Commercial Toilet Accessories									
Remove Paper Towel Dispenser	1.00 ea	119.05 /ea	119			-	119.05 /ea	119	
Demo Wall Mirror	1.00 ea	158.77 /ea	159			-	158.77 /ea	159	
Install New Wall Mirror, ADA Compliant	1.00 ea	476.23 /ea	476	215.14 /ea	215	-	691.37 /ea	691	
Bathroom accessories, grab bar, straight, 1-1/2" dia, SS, 24" long	2.00 ea	95.26 /ea	191	88.54 /ea	177	-	183.79 /ea	368	
Bathroom accessories, towel dispenser, sst, surf mounted, ADA	1.00 ea	79.36 /ea	79	96.97 /ea	97	-	176.33 /ea	176	
Commercial Toilet Accessories			*1,024*		*489*			*1,513*	
Specialties		*/ls*	*1,024*	*/ls*	*489*		*/ls*	*1,513*	
220000.00 Plumbing									
220505.10 Plumbing Labor									
Plumbing Labor, Plumber, Foreman, reuse piping and connections	2.00 hr	194.92 /hr	390	26.38 /hr	53	-	221.29 /hr	443	
Plumbing demo, faucet	1.00 ea	194.90 /ea	195	-	-	-	194.90 /ea	195	
Plumbing Labor			*585*		*53*			*637*	
220719.10 Piping Insulation									
Insulated protector, piping under sink/lav, P trap, 1-1/4 or 1-1/2"	1.00 ea	77.98 /ea	78	49.71 /ea	50	-	127.69 /ea	128	
Insulated protector,piping under sink/lav,valva/supply 1/2 thru 7/16"	1.00 ea	77.98 /ea	78	49.74 /ea	50	-	127.72 /ea	128	
Insulated protector, piping under sink/lav, drain cover, 1-1/4 1-1/2"	1.00 ea	77.96 /ea	78	52.10 /ea	52	-	130.06 /ea	130	
Insulated protector, piping under sink/lav, tailpiece offset, 1-1/4"	1.00 ea	77.96 /ea	78	58.00 /ea	58	-	135.96 /ea	136	

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
Piping Insulation			*312*		*210*			*521*	
224139.10 Faucets And Fittings									
Faucets/fittings, lav. faucet, ADA lever handle, polished chrome	1.00 ea	234.16 /ea	234	411.43 /ea	411	-	645.59 /ea	646	
Faucets And Fittings			*234*		*411*			*646*	
Plumbing		*/ls*	*1,131*	*/ls*	*674*		*/ls*	*1,805*	
A028		*/ls*	*7,073*	*/ls*	*2,119*	*5*	*/ls*	*9,198*	
A029									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	34.07 hr	72.48 /hr	2,469	-	-	-	72.48 /hr	2,469	
			2,469					*2,469*	
General Requirements		*/ls*	*2,469*	*/ls*			*/ls*	*2,469*	
060000.00 Wood, Plastics, and Composites									
060505.20 Demolition									
Remove Countertop and base cabinets	10.00 lf	203.42 /lf	2,034	-	-	-	203.42 /lf	2,034	
Remove Wall cabinets	12.00 lf	50.86 /lf	610	-	-	-	50.86 /lf	610	
Demolition			*2,644*					*2,644*	
Wood, Plastics, and Composites		*/*****	*2,644*	*/*****			*/*****	*2,644*	
090000.00 Finishes									
099123.72 Walls And Ceilings									
Prepare, Prime and Paint GWB Walls	120.00 sf	5.02 /sf	602	0.72 /sf	86	-	5.73 /sf	688	
Walls And Ceilings			*602*		*86*			*688*	
Finishes		*/ls*	*602*	*/ls*	*86*		*/ls*	*688*	
110000.00 Equipment									
114813.10 Appliances									
Garbage Disposal Sink type	1.00 ea	375.16 /ea	375	236.32 /ea	236	-	611.48 /ea	611	D
Appliances			*375*		*236*			*611*	
Equipment		*/ls*	*375*	*/ls*	*236*		*/ls*	*611*	
120000.00 Furnishings									
123213.10 Cabinets / Counters / Shelves									
Kitchen Base Cabinets	10.00 lf	136.06 /lf	1,361	284.85 /lf	2,849	-	420.91 /lf	4,209	
Kitchen Wall Cabinets	12.00 lf	144.01 /lf	1,728	242.65 /lf	2,912	-	386.66 /lf	4,640	
Countertops, custom, plastic laminate, square edge, plastic face, 7/8" thick, includes backsplash	10.00 lf	84.61 /lf	846	126.31 /lf	1,263	-	210.92 /lf	2,109	
Cabinets / Counters / Shelves			*3,935*		*7,023*			*10,958*	
123623.10 Countertops									
Counter top, stock, plastic lam, Pipe Screen, 2'-6" x 2'-0"	1.00 ea	190.54 /ea	191	151.01 /ea	151	-	341.55 /ea	342	
Counter top, support bracket	2.00 ea	84.78 /ea	170	58.03 /ea	116	-	142.80 /ea	286	
Countertops			*360*		*267*			*627*	
Furnishings		*/ls*	*4,295*	*/ls*	*7,290*		*/ls*	*11,585*	
220000.00 Plumbing									
220505.10 Plumbing Labor									

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
220505.10 Plumbing Labor									
Plumbing Labor, Plumber, Foreman, reuse piping and connections	4.00 hr	194.92 /hr	780	26.38 /hr	106	-	221.30 /hr	885	
Plumbing dml, RELOCATION OF DWV & WATER SERVICES	4.00 hr	194.91 /hr	780	105.50 /hr	422	-	300.41 /hr	1,202	
Plumbing dml, fixture, garbage disposal	1.00 hr	194.93 /hr	195	-	-	-	194.93 /hr	195	
Plumbing demo, sink, single compartment, piping	1.00 ea	194.90 /ea	195	-	-	-	194.90 /ea	195	
Plumbing demo, faucet	1.00 ea	194.94 /ea	195	-	-	-	194.94 /ea	195	
Plumbing Labor			*2,144*		*528*			*2,672*	
224116.30 Sinks									
Sinks, W/ faucets & dr, kitchen, SS, self rimming, 25" x 22" sgl bowl, ADA compliant	1.00 ea	501.19 /ea	501	1,086.08 /ea	1,086	-	1,587.27 /ea	1,587	
Sinks			*501*		*1,086*			*1,587*	
Plumbing		*/ls*	*2,645*	*/ls*	*1,614*		*/ls*	*4,259*	
A029		*/ls*	*13,031*	*/ls*	*9,226*		*/ls*	*22,257*	
A030									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	92.89 hr	72.48 /hr	6,733	-	-	-	72.48 /hr	6,733	
			6,733					*6,733*	
General Requirements		*/ls*	*6,733*	*/ls*			*/ls*	*6,733*	
060000.00 Wood, Plastics, and Composites									
060505.20 Demolition									
Remove Console	28.00 lf	143.03 /lf	4,005	-	-	-	143.03 /lf	4,005	
Remove Countertop and base cabinets	24.00 lf	203.42 /lf	4,882	-	-	-	203.42 /lf	4,882	
Demolition			*8,887*					*8,887*	
Wood, Plastics, and Composites		*/*****	*8,887*	*/*****			*/*****	*8,887*	
120000.00 Furnishings									
123213.10 Cabinets / Counters / Shelves									
Kitchen Base Cabinets	24.00 lf	136.07 /lf	3,266	284.85 /lf	6,836	-	420.92 /lf	10,102	
Countertops, custom, plastic laminate, square edge, plastic face, 7/8" thick, includes backsplash	24.00 lf	84.61 /lf	2,031	126.31 /lf	3,031	-	210.92 /lf	5,062	
Winsted Control Room Consoles	14.00 ea	158.75 /ea	2,223	7,233.92 /ea	101,275	-	7,392.68 /ea	103,497	
Cabinets / Counters / Shelves			*7,519*		*111,143*			*118,662*	
Furnishings		*/ls*	*7,519*	*/ls*	*111,143*		*/ls*	*118,662*	
220000.00 Plumbing									
220505.10 Plumbing Labor									
Plumbing Labor, Plumber, Foreman, reuse piping and connections	4.00 hr	194.92 /hr	780	26.38 /hr	106	-	221.30 /hr	885	
Plumbing dml, RELOCATION OF DWV & WATER SERVICES	4.00 hr	194.91 /hr	780	105.50 /hr	422	-	300.41 /hr	1,202	
Plumbing Labor, DEMO Remote Water Chiller	1.00 hr	194.93 /hr	195	105.50 /hr	106	-	300.43 /hr	300	
Plumbing demo, sink, single compartment, piping	1.00 ea	194.94 /ea	195	-	-	-	194.94 /ea	195	
Plumbing demo, faucet	1.00 ea	194.91 /ea	195	-	-	-	194.91 /ea	195	
Plumbing demo, water heater, 6 gal	1.00 ea	389.83 /ea	390	-	-	-	389.83 /ea	390	

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
Plumbing Labor			*2,534*		*633*			*3,167*	
223330.13 Water Heaters									
Water heaters, point of use, com (ashrae energy std. 90), 6 gallon	1.00 ea	623.74 /ea	624	1,169.15 /ea	1,169	-	1,792.89 /ea	1,793	
Water Heaters			*624*		*1,169*			*1,793*	
224116.30 Sinks									
Sinks, W/ faucets & dr, kitchen, SS, self rimming, 25" x 22" sgl bowl, ADA compliant	1.00 ea	501.23 /ea	501	1,086.05 /ea	1,086	-	1,587.28 /ea	1,587	
Sinks			*501*		*1,086*			*1,587*	
224723.10 Water Dispensers									
Water chillers remote, aircooled, 50<F outlet, 115v, 1.3 GPH, Elkay ERS1	1.00 ea	283.53 /ea	284	1,181.60 /ea	1,182	-	1,465.13 /ea	1,465	
Water Dispensers			*284*		*1,182*			*1,465*	
Plumbing		*/ls*	*3,942*	*/ls*	*4,070*		*/ls*	*8,012*	
280000.00 Electronic Safety and Security									
281616.50 Detection Devices									
Detection systems, fire alarm control panel, Remove and Reinstall	1.00 ea	8,651.95 /ea	8,652	0.00 /ea	0	-	8,651.95 /ea	8,652	
Detection Devices			*8,652*					*8,652*	
Electronic Safety and Security		*/ls*	*8,652*	*/ls*			*/ls*	*8,652*	
A030		*/ls*	*35,733*	*/ls*	*115,212*		*/ls*	*150,945*	
A031									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	16.35 hr	72.48 /hr	1,185	-	-	-	72.48 /hr	1,185	
			1,185					*1,185*	
General Requirements		*/ls*	*1,185*	*/ls*			*/ls*	*1,185*	
090000.00 Finishes									
090505.20 Selective Demolition									
Flooring demo, carpet, bonded, including surface scraping - Floors (small area)	350.00 sf	7.63 /sf	2,670	-	-	-	7.63 /sf	2,670	D
Selective Demolition			*2,670*					*2,670*	
096813.10 Carpet Tile									
Carpet Tile, FAA Series Static-Free ESD Tiles, 2' x 2'	39.00 sy	41.80 /sy	1,630	79.00 /sy	3,081	-	130.86 /sy	5,104	D
Carpet Tile			*1,630*		*3,081*			*5,104*	
Finishes		*/ls*	*4,300*	*/ls*	*3,081*		*/ls*	*7,773*	
A031		*/ls*	*5,485*	*/ls*	*3,081*		*/ls*	*8,958*	
A032									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	177.43 hr	72.48 /hr	12,860	-	-	-	72.48 /hr	12,860	
			12,860					*12,860*	

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
General Requirements		/ls	*12,860*	/ls			/ls	*12,860*	
090000.00 Finishes									
090505.20 Selective Demolition									
Flooring demo, prep existing floor for new finish	1,420.00 sf	13.79 /sf	19,577	-	-	7,214	18.87 /sf	26,791	
Flooring demo, Vinyl Floor Tiles	1,420.00 sf	10.59 /sf	15,038	-	-	-	10.59 /sf	15,038	D
Selective Demolition			*34,615*			*7,214*		*41,829*	
096519.10 Resilient Tile Flooring									
Resilient, vinyl composition tile, 1/8" thick, solid	1,420.00 sf	11.61 /sf	16,480	4.87 /sf	6,918	-	16.48 /sf	23,397	D
Resilient Tile Flooring			*16,480*		*6,918*			*23,397*	
Finishes		/ls	*51,095*	/ls	*6,918*	*7,214*	/ls	*65,227*	
A032		/ls	*63,955*	/ls	*6,918*	*7,214*	/ls	*78,086*	
A033									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	13.44 hr	72.48 /hr	974	-	-	-	72.48 /hr	974	
			974					*974*	
General Requirements		/ls	*974*	/ls			/ls	*974*	
090000.00 Finishes									
090505.20 Selective Demolition									
Flooring demo, carpet, bonded, including surface scraping - Floors (small area)	370.00 sf	7.63 /sf	2,822	-	-	-	7.63 /sf	2,822	D
Selective Demolition			*2,822*					*2,822*	
096816.10 Sheet Carpet									
Carpet, com grs, direct cem, nylon, plush, 42 oz., med to hvy traffic	41.00 sy	19.47 /sy	798	73.96 /sy	3,032	-	93.43 /sy	3,831	D
Sheet Carpet			*798*		*3,032*			*3,831*	
Finishes		/ls	*3,621*	/ls	*3,032*		/ls	*6,653*	
A033		/ls	*4,595*	/ls	*3,032*		/ls	*7,627*	
A034									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	8.63 hr	72.48 /hr	625	-	-	-	72.48 /hr	625	
			625					*625*	
General Requirements		/ls	*625*	/ls			/ls	*625*	
090000.00 Finishes									
095123.10 Suspended Acoustic Ceiling Tiles									
Remove & Repl Acoustical Ceiling Tiles - 2' x 2' - Black, Spec Order	575.00 sf	4.76 /sf	2,739	4.41 /sf	2,536	-	9.17 /sf	5,274	D
Suspended Acoustic Ceiling Tiles			*2,739*		*2,536*			*5,274*	
Finishes		/ls	*2,739*	/ls	*2,536*		/ls	*5,274*	
A034		/ls	*3,364*	/ls	*2,536*		/ls	*5,900*	
A035									
010000.00 General Requirements									
013113.20									

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
013113.20									
Field personnel, misc labor, cleanup	18.09 hr	72.48 /hr	1,311	-	-	-	72.48 /hr	1,311	
			1,311					*1,311*	
General Requirements		*/ls*	*1,311*	*/ls*			*/ls*	*1,311*	
090000.00 Finishes									
099123.35 Doors & Windows									
Prepare, Prime and Paint Wood or Metal Doors and Frames	300.00 sf	9.44 /sf	2,832	0.32 /sf	95	-	9.76 /sf	2,927	
Doors & Windows			*2,832*		*95*			*2,927*	
099713.23 Misc Repairs & Cleaning									
Remove Rust/Peeling/Cracking Paint and Prepare for New Paint	300.00 sf	6.42 /sf	1,927	0.32 /sf	95	-	6.74 /sf	2,022	
Misc Repairs & Cleaning			*1,927*		*95*			*2,022*	
Finishes		*/ls*	*4,760*	*/ls*	*190*		*/ls*	*4,950*	
A035		***/ls***	***6,071***	***/ls***	***190***		***/ls***	***6,261***	
A036									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	17.78 hr	72.48 /hr	1,289	-	-	-	72.48 /hr	1,289	
			1,289					*1,289*	
General Requirements		*/ls*	*1,289*	*/ls*			*/ls*	*1,289*	
090000.00 Finishes									
097223.10 Wallpaper									
Wall covering, vinyl, REMOVE & DISPOSE	400.00 sf	3.44 /sf	1,377			-	3.44 /sf	1,377	D
Wall covering, vinyl, fabric-backed, mdm weight, type 2,(20-24oz/SY)	400.00 sf	8.61 /sf	3,444	1.71 /sf	682	-	10.32 /sf	4,126	D
Wallpaper			*4,821*		*682*			*5,503*	
Finishes		*/ls*	*4,821*	*/ls*	*682*		*/ls*	*5,503*	
A036		***/ls***	***6,109***	***/ls***	***682***		***/ls***	***6,792***	
A037									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	3.43 hr	72.48 /hr	249	-	-	-	72.48 /hr	249	
			249					*249*	
General Requirements		*/ls*	*249*	*/ls*			*/ls*	*249*	
090000.00 Finishes									
090505.30 Selective Demolition									
Remove GWB from studs - Walls or Ceilings	10.00 sf	5.97 /sf	60	-	-	-	5.97 /sf	60	
Selective Demolition			*60*					*60*	
092116.33 Partition Wall									
Partition - 1 layer 5/8 GWB,taped bs, met stud, insul, non rated	10.00 sf	6.35 /sf	64	2.51 /sf	25	4	9.28 /sf	93	

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
Partition Wall			*64*		*25*	*4*		*93*	
099123.72 Walls And Ceilings									
Prepare, Prime and Paint GWB Walls	160.00 sf	5.02 /sf	802	0.72 /sf	115	-	5.73 /sf	917	
Walls And Ceilings			*802*		*115*			*917*	
Finishes		*/ls*	*926*	*/ls*	*140*	*4*	*/ls*	*1,070*	
A037		*/ls*	*1,174*	*/ls*	*140*	*4*	*/ls*	*1,318*	
A038									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	5.28 hr	72.49 /hr	383	-	-	-	72.49 /hr	383	
			383					*383*	
General Requirements		*/ls*	*383*	*/ls*			*/ls*	*383*	
100000.00 Specialties									
101423.13 Specialities									
Install Room Signage - ADA Compliant	31.00 ea	31.78 /ea	985	54.86 /ea	1,701	-	86.64 /ea	2,686	
Remove Room Signs, includes touch-up painting of walls	14.00 ea	25.43 /ea	356	2.11 /ea	30	-	27.54 /ea	386	
Specialities			*1,341*		*1,730*			*3,071*	
Specialties		*/ls*	*1,341*	*/ls*	*1,730*		*/ls*	*3,071*	
A038		*/ls*	*1,724*	*/ls*	*1,730*		*/ls*	*3,454*	
A039									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	21.99 hr	72.48 /hr	1,594	-	-	-	72.48 /hr	1,594	
			1,594					*1,594*	
General Requirements		*/ls*	*1,594*	*/ls*			*/ls*	*1,594*	
070000.00 Thermal and Moisture Protection									
079210.10 Caulking And Sealants									
Caulking & sealants, joint around window frames, int & ext	160.00 lf	25.82 /lf	4,131	1.88 /lf	300	-	27.70 /lf	4,432	
Caulking And Sealants			*4,131*		*300*			*4,432*	
Thermal and Moisture Protection		*/ls*	*4,131*	*/ls*	*300*		*/ls*	*4,432*	
080000.00 Openings									
080505.20 Selective Demolition Of Glazing									
Window demolition, glass, minimum	80.00 sf	5.09 /sf	407	-	-	-	5.09 /sf	407	D
Selective Demolition Of Glazing			*407*					*407*	
085113.20 Aluminum Windows									
Aluminum wdws, 1"th dbl glazed, tempered, (2) 1/4" tinted insul glass, 1/2" airs pace	80.00 sf	16.95 /sf	1,356	98.72 /sf	7,898	-	115.67 /sf	9,254	D
Aluminum Windows			*1,356*		*7,898*			*9,254*	
Openings		*/ls*	*1,763*	*/ls*	*7,898*		*/ls*	*9,661*	
A039		*/ls*	*7,488*	*/ls*	*8,198*		*/ls*	*15,686*	
A040									
010000.00 General Requirements									

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
013113.20									
Field personnel, misc labor, cleanup	5.75 hr	72.48 /hr	417	-	-	-	72.48 /hr	417	
			417					*417*	
General Requirements		*/ls*	*417*	*/ls*			*/ls*	*417*	
090000.00 Finishes									
099123.75 Misc. Painting									
Prep, Prime & Paint Pipe Column	100.00 lf	8.69 /lf	869	1.69 /lf	169	-	10.38 /lf	1,038	
Misc. Painting			*869*		*169*			*1,038*	
099713.23 Misc Repairs & Cleaning									
Remove Rust/Peeling/Cracking Paint and Prepare for New Paint	100.00 sf	6.43 /sf	642	0.32 /sf	32	-	6.74 /sf	674	
Misc Repairs & Cleaning			*642*		*32*			*674*	
Finishes		*/ls*	*1,512*	*/ls*	*200*		*/ls*	*1,712*	
A040		*/ls*	***1,928***	*/ls*	***200***		*/ls*	***2,129***	
A041									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	60.64 hr	72.48 /hr	4,395	-	-	-	72.48 /hr	4,395	
			4,395					*4,395*	
General Requirements		*/ls*	*4,395*	*/ls*			*/ls*	*4,395*	
070000.00 Thermal and Moisture Protection									
079210.10 Caulking And Sealants									
Remove & Replace damaged Sealants	500.00 lf	11.15 /lf	5,576	2.53 /lf	1,266	1,435	16.55 /lf	8,277	
Caulking And Sealants			*5,576*		*1,266*	*1,435*		*8,277*	
Thermal and Moisture Protection		*/ls*	*5,576*	*/ls*	*1,266*	*1,435*	*/ls*	*8,277*	
090000.00 Finishes									
099123.75 Misc. Painting									
Prepare & Paint Metal Panel	700.00 sf	10.94 /sf	7,659	1.37 /sf	960	-	12.31 /sf	8,619	
Misc. Painting			*7,659*		*960*			*8,619*	
099713.23 Misc Repairs & Cleaning									
Remove Peeling/Cracking Paint and Prepare for New Paint	700.00 sf	5.14 /sf	3,598	0.25 /sf	177	-	5.39 /sf	3,775	
Misc Repairs & Cleaning			*3,598*		*177*			*3,775*	
Finishes		*/ls*	*11,257*	*/ls*	*1,137*		*/ls*	*12,394*	
A041		*/ls*	***21,228***	*/ls*	***2,403***	***1,435***	*/ls*	***25,066***	
A042									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	626.67 hr	72.48 /hr	45,420	-	-	-	72.48 /hr	45,420	
			45,420					*45,420*	
General Requirements		*/ls*	*45,420*	*/ls*			*/ls*	*45,420*	
07-42-13.00 Metal Wall Panels									
07-42-13.30 Steel Siding									

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
07-42-13.30 Steel Siding									
Steel siding, factory sandwich panel, 2" insulation, galvanized, baked enamel exterior, 22 gauge, incl. fasteners	14,100.00 sf	7.00 /sf	98,714	27.84 /sf	392,475	-	34.84 /sf	491,189	
Steel Siding			*98,714*		*392,475*			*491,189*	
Metal Wall Panels			*98,714*		*392,475*			*491,189*	
A042		*/ls*	*144,134*	*/ls*	*392,475*		*/ls*	*536,609*	
A043									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	6.53 hr	72.48 /hr	473	-	-	-	72.48 /hr	473	
			473					*473*	
General Requirements		*/ls*	*473*	*/ls*			*/ls*	*473*	
090000.00 Finishes									
099123.75 Misc. Painting									
Prepare & Paint Roof Hatch	45.00 sf	33.43 /sf	1,504	6.33 /sf	285	-	39.76 /sf	1,789	
Misc. Painting			*1,504*		*285*			*1,789*	
099713.23 Misc Repairs & Cleaning									
Remove Peeling/Cracking Paint and Prepare for New Paint	45.00 sf	5.14 /sf	231	0.25 /sf	11	-	5.39 /sf	243	
Misc Repairs & Cleaning			*231*		*11*			*243*	
Finishes		*/ls*	*1,736*	*/ls*	*296*		*/ls*	*2,032*	
A043		*/ls*	*2,209*	*/ls*	*296*		*/ls*	*2,505*	
A044									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	4.53 hr	72.48 /hr	328	-	-	-	72.48 /hr	328	
			328					*328*	
General Requirements		*/ls*	*328*	*/ls*			*/ls*	*328*	
070000.00 Thermal and Moisture Protection									
076510.10 Flashing									
Metal Roof Flashing and counter flashing	15.00 lf	14.98 /lf	225	6.25 /lf	94	-	21.23 /lf	318	
Flashing			*225*		*94*			*318*	
077233.10 Roof Hatches									
Demo Roof Access Hatch	1.00 ea	630.09 /ea	630			-	630.09 /ea	630	
Roof Hatches			*630*					*630*	
Thermal and Moisture Protection		*/ls*	*855*	*/ls*	*94*		*/ls*	*949*	
07-72-33.00 Roof Hatches									
07-72-33.10 Roof Curb Options									
Roof hatch, with curb, 1" fiberglass insulation, galvanized steel curb & cover, 2'-6" x 5'	1.00 ea	304.11 /ea	304	2,281.57 /ea	2,282	-	2,585.68 /ea	2,586	
Roof Curb Options			*304*		*2,282*			*2,586*	
Roof Hatches			*304*		*2,282*			*2,586*	

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
A044		*/ls*	*1,487*	*/ls*	*2,375*		*/ls*	*3,863*	
A045									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	6.56 hr	72.48 /hr	475	-	-	-	72.48 /hr	475	
			475					*475*	
General Requirements		*/ls*	*475*	*/ls*			*/ls*	*475*	
090000.00 Finishes									
099123.75 Misc. Painting									
Prepare, Prime & Paint Handrail/Guardrail	100.00 lf	9.36 /lf	936	3.18 /lf	318	-	12.54 /lf	1,254	
Misc. Painting			*936*		*318*			*1,254*	
099656.20 Sand and Paint/Stain									
Remove paint from Handrail/Guardrail	100.00 lf	8.19 /lf	819	4.22 /lf	422	-	12.41 /lf	1,241	
Sand and Paint/Stain			*819*		*422*			*1,241*	
Finishes		*/ls*	*1,755*	*/ls*	*740*		*/ls*	*2,495*	
A045		*/ls*	*2,231*	*/ls*	*740*		*/ls*	*2,971*	
A046									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	8.53 hr	72.48 /hr	618	-	-	-	72.48 /hr	618	
			618					*618*	
General Requirements		*/ls*	*618*	*/ls*			*/ls*	*618*	
090000.00 Finishes									
099123.75 Misc. Painting									
Prepare, Prime & Paint Handrail/Guardrail	130.00 lf	9.36 /lf	1,217	3.18 /lf	414	-	12.54 /lf	1,631	
Misc. Painting			*1,217*		*414*			*1,631*	
099656.20 Sand and Paint/Stain									
Remove paint from Handrail/Guardrail	130.00 lf	8.19 /lf	1,065	4.22 /lf	549	-	12.41 /lf	1,613	
Sand and Paint/Stain			*1,065*		*549*			*1,613*	
Finishes		*/ls*	*2,282*	*/ls*	*962*		*/ls*	*3,244*	
A046		*/ls*	*2,900*	*/ls*	*962*		*/ls*	*3,862*	
A047									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	254.85 hr	72.48 /hr	18,471	-	-	-	72.48 /hr	18,471	
			18,471					*18,471*	
General Requirements		*/ls*	*18,471*	*/ls*			*/ls*	*18,471*	
070000.00 Thermal and Moisture Protection									
070505.10 Selective Demolition									
Remove Roof Membrane, Insul and deck (substrate) - small projects/ATCT	680.00 sf	49.58 /sf	33,716	0.74 /sf	502	574	51.17 /sf	34,793	D
Selective Demolition			*33,716*		*502*	*574*		*34,793*	
072216.10 Roof Deck Insulation									

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
072216.10 Roof Deck Insulation									
Roof deck insulation, densdeck, fiberboard low density, 1/2" thick R1.39	680.00 sf	3.60 /sf	2,445	0.68 /sf	465	-	4.28 /sf	2,910	
Roof deck insulation, perlite, 2-1/2" thick R6.67, small job	680.00 sf	9.89 /sf	6,724	2.93 /sf	1,994	43	12.89 /sf	8,761	
Roof deck insulation, perlite, tapered for drainage, small job	680.00 sf	13.48 /sf	9,169	3.14 /sf	2,138	57	16.71 /sf	11,364	
Roof Deck Insulation			*18,338*		*4,597*	*100*		*23,036*	
072610.10 Vapor Retarders									
Polyethylene vapor barrier, std, .006" thick	6.80 sq	114.30 /sq	777	12.64 /sq	86	1	127.05 /sq	864	D
Vapor Retarders			*777*		*86*	*1*		*864*	
075113.50 Walkways For Built-Up Roofs									
Roof Walkway, rubber walkway pads	250.00 sf	19.07 /sf	4,768	3.78 /sf	944	-	22.85 /sf	5,712	
Walkways For Built-Up Roofs			*4,768*		*944*			*5,712*	
075323.20 Roofing Membrane									
PVC membrane flashing, for penetration, roof hatch	1.00 ea	981.32 /ea	981	189.90 /ea	190	412	1,583.17 /ea	1,583	D
PVC membrane flashing, for beacon light	1.00 ea	245.33 /ea	245	47.46 /ea	47	103	395.78 /ea	396	D
PVC membrane flashing, for exhaust fan	1.00 ea	245.33 /ea	245	47.49 /ea	47	103	395.80 /ea	396	D
PVC membrane flashing, for railing post penetration, 4 sf per post	20.00 ea	245.34 /ea	4,907	47.48 /ea	950	2,060	395.79 /ea	7,916	D
Roofing Membrane			*6,379*		*1,234*	*2,678*		*10,291*	
Thermal and Moisture Protection		*/ls*	*63,978*	*/ls*	*7,364*	*3,353*	*/ls*	*74,695*	
07-42-13.00 Metal Wall Panels									
07-54-19.10 Polyvinyl-Chloride Roofing (PVC)									
Polyvinyl-chloride roofing, (PVC), heat welded seams, reinforced, 0.40 P.S.F., fully adhered with adhesive, 60 mils	6.80 sq	432.80 /sq	2,943	326.49 /sq	2,220	120	776.89 /sq	5,283	D
Polyvinyl-chloride roofing, (PVC), heat welded seams, reinforced, 0.40 P.S.F., fully adhered with adhesive, 60 mils - membrane flashing	100.00 lf	4.33 /lf	433	3.26 /lf	326	18	7.77 /lf	777	D
Polyvinyl-Chloride Roofing (PVC)			*3,376*		*2,547*	*137*		*6,060*	
Metal Wall Panels			*3,376*		*2,547*	*137*		*6,060*	
A047		*/ls*	*85,825*	*/ls*	*9,911*	*3,490*	*/ls*	*99,226*	
A048									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	5.92 hr	72.48 /hr	429	-	-	-	72.48 /hr	429	
			429					*429*	
General Requirements		*/ls*	*429*	*/ls*			*/ls*	*429*	
07-05-00.00 Common Work Results For Thermal And Moisture Protection									
07-05-05.10 Selective Demo., Thermal And Moisture Protection									
Selective demolition, thermal and moisture protection, downspouts, including hangers	25.00 lf	1.58 /lf	39	-	-	-	1.58 /lf	39	D
Roofing and siding demolition, gutters, aluminum or wood, edge hung	100.00 lf	2.30 /lf	230	-	-	-	2.30 /lf	230	D

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
Selective Demo., Thermal And Moisture Protection			*270*					*270*	
Common Work Results For Thermal And Moisture Protection			*270*					*270*	
07-71-23.00 Manufactured Gutters And Downspouts									
07-71-23.10 Downspouts									
Steel downspouts, galvanized, round, corrugated, 5" diameter, 26 gauge	25.00 lf	6.28 /lf	157	8.33 /lf	208	-	14.61 /lf	365	D
Downspouts			*157*		*208*			*365*	
07-71-23.30 Gutters									
Galvanized steel gutters, half round or box, enameled, 5" wide, 28 gauge	100.00 lf	6.53 /lf	653	5.09 /lf	509	-	11.62 /lf	1,162	D
Gutters			*653*		*509*			*1,162*	
Manufactured Gutters And Downspouts			*810*		*717*			*1,527*	
A048		*/ls*	*1,509*	*/ls*	*717*		*/ls*	*2,226*	
A049									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	302.04 hr	72.48 /hr	21,891	-	-	-	72.48 /hr	21,891	
			21,891					*21,891*	
General Requirements		*/ls*	*21,891*	*/ls*			*/ls*	*21,891*	
070000.00 Thermal and Moisture Protection									
070505.10 Selective Demolition									
Remove Roof Membrane, Insul and deck (substrate) - small projects/ATCT	660.00 sf	49.58 /sf	32,725	0.74 /sf	487	557	51.17 /sf	33,769	D
Selective Demolition			*32,725*		*487*	*557*		*33,769*	
072216.10 Roof Deck Insulation									
Roof deck insulation, densdeck, fiberboard low density, 1/2" thick R1.39	660.00 sf	3.60 /sf	2,373	0.68 /sf	452	-	4.28 /sf	2,825	
Roof deck insulation, perlite, 2-1/2" thick R6.67, small job	660.00 sf	9.89 /sf	6,526	2.93 /sf	1,936	42	12.88 /sf	8,504	
Roof deck insulation, perlite, tapered for drainage, small job	660.00 sf	13.48 /sf	8,899	3.14 /sf	2,075	56	16.71 /sf	11,030	
Roof Deck Insulation			*17,799*		*4,462*	*97*		*22,359*	
072610.10 Vapor Retarders									
Polyethylene vapor barrier, std, .006" thick	6.60 sq	114.30 /sq	754	12.64 /sq	83	1	127.04 /sq	838	D
Vapor Retarders			*754*		*83*	*1*		*838*	
075113.50 Walkways For Built-Up Roofs									
Roof Walkway, rubber walkway pads	325.00 sf	19.07 /sf	6,198	3.78 /sf	1,228	-	22.85 /sf	7,425	
Walkways For Built-Up Roofs			*6,198*		*1,228*			*7,425*	
075323.20 Roofing Membrane									
PVC membrane flashing, for penetration, roof hatch	1.00 ea	981.31 /ea	981	189.90 /ea	190	412	1,583.17 /ea	1,583	D
PVC membrane flashing, for roof drain	3.00 ea	245.34 /ea	736	47.48 /ea	142	309	395.79 /ea	1,187	D
PVC membrane flashing, for exhaust fan	1.00 ea	245.34 /ea	245	47.50 /ea	48	103	395.82 /ea	396	D
PVC membrane flashing, for railing post penetration, 4 sf per post	26.00 ea	245.34 /ea	6,379	47.48 /ea	1,234	2,678	395.79 /ea	10,291	D

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
075323.20 Roofing Membrane									
PVC membrane flashing, for condensing unit curb	2.00 ea	981.33 /ea	1,963	189.90 /ea	380	824	1,583.17 /ea	3,166	D
Roofing Membrane			*10,304*		*1,994*	*4,325*		*16,623*	
Thermal and Moisture Protection		*/ls*	*67,780*	*/ls*	*8,255*	*4,981*	*/ls*	*81,015*	
07-42-13.00 Metal Wall Panels									
07-54-19.10 Polyvinyl-Chloride Roofing (PVC)									
Polyvinyl-chloride roofing, (PVC), heat welded seams, reinforced, 0.40 P.S.F., fully adhered with adhesive, 60 mils	6.60 sq	432.80 /sq	2,856	326.49 /sq	2,155	116	776.89 /sq	5,127	D
Polyvinyl-chloride roofing, (PVC), heat welded seams, reinforced, 0.40 P.S.F., fully adhered with adhesive, 60 mils - membrane flashing	130.00 lf	4.33 /lf	562	3.26 /lf	424	23	7.77 /lf	1,010	D
Polyvinyl-Chloride Roofing (PVC)			*3,419*		*2,579*	*139*		*6,137*	
Metal Wall Panels			*3,419*		*2,579*	*139*		*6,137*	
A049		*/ls*	*93,090*	*/ls*	*10,834*	*5,119*	*/ls*	*109,044*	
A050									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	13.00 hr	72.48 /hr	942	-	-	-	72.48 /hr	942	
			942					*942*	
General Requirements		*/ls*	*942*	*/ls*			*/ls*	*942*	
050000.00 Metals									
051516.50 Gates									
Stair Gate - 3' 6" w x 3' 6" h, perf mtl panel infill, self closing hinges	1.00 ea	748.62 /ea	749	1,077.15 /ea	1,077	-	1,825.77 /ea	1,826	
Gates			*749*		*1,077*			*1,826*	
057323.50 Metal Railing									
Attach Vertical Posts to Roof Structure for Guard Rail Assy., inc. fasteners, flashing, demo & repair of roofing	6.00 ea	450.80 /ea	2,705	184.63 /ea	1,108	-	635.42 /ea	3,813	
Guard Rail 42" high,1 1/2" dia. galv., inc. horiz. rails @ 42" & 21', inc. vertical posts every 5'	20.00 lf	63.11 /lf	1,262	106.56 /lf	2,131		169.67 /lf	3,393	
Metal Railing			*3,967*		*3,239*			*7,206*	
Metals		*/ls*	*4,716*	*/ls*	*4,316*		*/ls*	*9,032*	
A050		*/ls*	*5,658*	*/ls*	*4,316*		*/ls*	*9,974*	
A051									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	4.00 hr	72.48 /hr	290	-	-	-	72.48 /hr	290	
Field personnel, Controls Technician/ Programming	8.00 hr	263.75 /hr	2,110	-	-	-	263.75 /hr	2,110	
			2,400					*2,400*	
General Requirements		*/ls*	*2,400*	*/ls*			*/ls*	*2,400*	
140000.00 Conveying Equipment									
142123.10 Elevators									

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
142123.10 Elevators									
Elevators, Hallway Call Buttons Replacement	4.00 ea	1,763.71 /ea	7,055	907.45 /ea	3,630	-	2,794.68 /ea	11,179	
Elevators			*7,055*		*3,630*			*11,179*	
142810.10 Elevator Controls And Doors									
Elevators, passenger elev. options, Sensors	1.00 ea	1,763.71 /ea	1,764	392.46 /ea	392	-	2,156.17 /ea	2,156	
Elevators, passenger elev. options, Floor Designations	8.00 ea	220.47 /ea	1,764	50.64 /ea	405	-	271.11 /ea	2,169	
Elevators, passenger elev. options, Control Panel, Replacement	1.00 ea	7,054.85 /ea	7,055	2,363.20 /ea	2,363	-	9,418.05 /ea	9,418	
Elevator Controls And Doors			*10,582*		*3,161*			*13,743*	
Conveying Equipment			*17,637*		*6,791*			*24,922*	
A051		*/ls*	*20,037*	*/ls*	*6,791*		*/ls*	*27,322*	
01 Architectural		*/ls*	*683,369*	*/ls*	*689,319*	*22,923*	*/ls*	*1,396,498*	
02 Mechanical									
M003									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	114.41 hr	72.48 /hr	8,292	-	-	-	72.48 /hr	8,292	
Field personnel, Controls Technician/BAS Programming	8.00 hr	263.75 /hr	2,110	-	-	-	263.75 /hr	2,110	
			10,402					*10,402*	
General Requirements		*/ls*	*10,402*	*/ls*			*/ls*	*10,402*	
220000.00 Plumbing									
220505.10 Plumbing Labor									
Plumbing demo, piping, metal, 7/8" dia	50.00 lf	7.80 /lf	390	-	-	-	7.80 /lf	390	
Plumbing demo, piping, metal, 3/8" dia	50.00 lf	7.80 /lf	390	-	-	-	7.80 /lf	390	
Plumbing Labor			*780*					*780*	
220719.10 Piping Insulation									
Insulation, pipe covering, fbgls, all svce jkt, 1" wall, 1-3/8" IPS	50.00 lf	12.22 /lf	611	3.58 /lf	179	-	15.80 /lf	790	
Insulation, pipe covering, finishes, for .010" sst, add	50.00 sf	16.52 /sf	826	7.66 /sf	383	-	24.18 /sf	1,209	
Piping Insulation			*1,437*		*562*			*1,999*	
221113.23 Pipe, Copper									
Pipe, refrigeration tubing, dryseal, 50' coils, 5/8" OD	1.00 coil	263.16 /coil	263	233.85 /coil	234	-	497.01 /coil	497	
Pipe, refrigeration tubing, dryseal, 50' coils, 1-5/8" OD	25.00 lf	23.19 /lf	580	20.57 /lf	514	5	43.97 /lf	1,099	
Pipe, Copper			*843*		*748*	*5*		*1,596*	
Plumbing		*/ls*	*3,060*	*/ls*	*1,310*	*5*	*/ls*	*4,375*	
230000.00 HVAC Components									
230505.10 Mech Labor									
HVAC demo, central station air handler unit, up thru 15 ton	2.00 ea	1,785.62 /ea	3,571	-	-	844	2,207.62 /ea	4,415	
HVAC demo, condensing unit, up thru 10 ton	2.00 ea	2,285.61 /ea	4,571	-	-	844	2,707.61 /ea	5,415	
HVAC demo, ductwork, metal, steel, sst, fabricated	50.00 lb	2.71 /lb	135	-	-	-	2.71 /lb	135	

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
Mech Labor			*8,278*			*1,688*		*9,966*	
230713.10 Duct & Equip Insulation									
Insulation, duct, blanket fbgls, fire res liner, 1" thk, 1.5 lb dens	80.00 sf	7.33 /sf	587	1.59 /sf	127	-	8.92 /sf	713	
Duct & Equip Insulation			*587*		*127*			*713*	
233113.13 Galvanized Metal Ducts									
Ductwork, fab rect, incl ftngs, SS, type 304, 100 to 500 LB	100.00 lb	24.05 /lb	2,405	5.45 /lb	545	-	29.50 /lb	2,950	
Galvanized Metal Ducts			*2,405*		*545*			*2,950*	
236213.10 Air Conditioning Units									
Condensing units, air cooled, compressor, std controls, 10 ton	1.00 ea	5,714.02 /ea	5,714	8,616.68 /ea	8,617	-	14,330.70 /ea	14,331	
Air Conditioning Units			*5,714*		*8,617*			*14,331*	
237313.20 Air Handling Units									
Central sta air-handling unit, DX pkgd, 4000 CFM, 10 ton	1.00 ea	13,575.99 /ea	13,576	28,624.00 /ea	28,624	-	42,199.99 /ea	42,200	
Air Handling Units			*13,576*		*28,624*			*42,200*	
HVAC Components		*/ls*	*30,559*	*/ls*	*37,913*	*1,688*	*/ls*	*70,160*	
260000.00 Electrical									
260590.10 Residential Wiring									
Electrician, labor - Reuse Electrical components	8.00 hr	180.25 /hr	1,442			-	180.25 /hr	1,442	
Residential Wiring			*1,442*					*1,442*	
Electrical		*/ls*	*1,442*	*/ls*			*/ls*	*1,442*	
26-28-16.00 Enclosed Switches And Circuit Breakers									
26-28-16.20 Safety Switches									
Disconnect switch, 3 pole fusible, 60 amp	2.00 ea	224.47 /ea	449	1,823.51 /ea	3,647	-	2,047.98 /ea	4,096	
Safety Switches			*449*		*3,647*			*4,096*	
Enclosed Switches And Circuit Breakers			*449*		*3,647*			*4,096*	
M003		*/ls*	*45,912*	*/ls*	*42,870*	*1,693*	*/ls*	*90,475*	
M004									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	15.76 hr	72.48 /hr	1,142	-	-	-	72.48 /hr	1,142	
			1,142					*1,142*	
General Requirements		*/ls*	*1,142*	*/ls*			*/ls*	*1,142*	
050000.00 Metals									
057323.50 Metal Railing									
DEMO - Metal Panel, enlarge existing holes	2.00 ea	360.64 /ea	721				360.64 /ea	721	
Metal Railing			*721*					*721*	
Metals		*/ls*	*721*	*/ls*			*/ls*	*721*	
230000.00 HVAC Components									
230505.10 Mech Labor									
HVAC demo, A/C units	1.00 ea	2,395.42 /ea	2,395	-	-	42	2,437.62 /ea	2,438	D
HVAC demo, A/C units	1.00 ea	2,395.45 /ea	2,395	-	-	42	2,437.65 /ea	2,438	

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
Mech Labor			*4,791*			*84*		*4,875*	
230953.10 Control Components									
Control components, sensor, electric operated, temperature	2.00 ea	144.19 /ea	288	269.75 /ea	540	-	413.94 /ea	828	
Control Components			*288*		*540*			*828*	
238119.10 Window Unit Air Conditioners									
Window unit A.C., window/thru-the-wall, 15 amp, 230V reqd, 36000 BTUH	1.00 ea	896.06 /ea	896	2,741.68 /ea	2,742	-	3,637.74 /ea	3,638	D
Window unit A.C., window/thru-the-wall, 15 amp, 230V reqd, 36000 BTUH	1.00 ea	896.02 /ea	896	2,741.69 /ea	2,742	-	3,637.71 /ea	3,638	
Window Unit Air Conditioners			*1,792*		*5,483*			*7,275*	
HVAC Components		*/ls*	*6,871*	*/ls*	*6,023*	*84*	*/ls*	*12,979*	
M004		***/ls***	***8,735***	***/ls***	***6,023***	***84***	***/ls***	***14,842***	
M005									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	33.22 hr	72.48 /hr	2,408	-	-	-	72.48 /hr	2,408	
			2,408					*2,408*	
General Requirements		*/ls*	*2,408*	*/ls*			*/ls*	*2,408*	
220000.00 Plumbing									
221113.23 Pipe, Copper									
Pipe cu solder joints, type L tubing, 2" dia incld fittings and hangers	10.00 lf	44.56 /lf	446	64.40 /lf	644	-	108.96 /lf	1,090	
Pipe, Copper			*446*		*644*			*1,090*	
Plumbing		*/ls*	*446*	*/ls*	*644*		*/ls*	*1,090*	
230000.00 HVAC Components									
230505.10 Mech Labor									
HVAC demo, central station air handler unit, up thru 15 ton	1.00 ea	1,785.62 /ea	1,786	-	-	422	2,207.62 /ea	2,208	D
Mech Labor			*1,786*			*422*		*2,208*	
237313.10 Air Handling Units									
Air handling unit, built-up, multi-zone, horiz/vert, 6000 CFM	1.00 ea	16,958.03 /ea	16,958	46,019.94 /ea	46,020	322	63,300.02 /ea	63,300	D
Air Handling Units			*16,958*		*46,020*	*322*		*63,300*	
HVAC Components		*/ls*	*18,744*	*/ls*	*46,020*	*744*	*/ls*	*65,508*	
260000.00 Electrical									
260590.10 Residential Wiring									
Electrician, labor - Reuse Electrical components	8.00 hr	180.25 /hr	1,442			-	180.25 /hr	1,442	
Residential Wiring			*1,442*					*1,442*	
262419.40 Motor Starters And Controls									
Motor starters & controls, magnetic, FVNR, NEMA 7, 5 HP, size 0	1.00 ea	702.97 /ea	703	2,383.38 /ea	2,383	-	3,086.35 /ea	3,086	
Motor Starters And Controls			*703*		*2,383*			*3,086*	
Electrical		*/ls*	*2,145*	*/ls*	*2,383*		*/ls*	*4,528*	

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
M005		***/ls***	***23,742***	***/ls***	***49,047***	***744***	***/ls***	***73,533***	
M006									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	0.75 hr	72.45 /hr	54	-	-	-	72.45 /hr	54	
			54					***54***	
General Requirements		***/ls***	***54***	***/ls***			***/ls***	***54***	
230000.00 HVAC Components									
230953.10 Control Components									
Valves, elec motor actuated, brass, 3 way, scrd, 2" pipe size - Repack valve	1.00 ea	285.06 /ea	285	1,311.29 /ea	1,311	-	1,596.35 /ea	1,596	
Control Components			***285***		***1,311***			***1,596***	
HVAC Components		***/ls***	***285***	***/ls***	***1,311***		***/ls***	***1,596***	
M006		***/ls***	***339***	***/ls***	***1,311***		***/ls***	***1,651***	
M007									
010000.00 General Requirements									
013113.20									
Field personnel, HVAC Technician, Test & Balance	2.00 hr	263.75 /hr	528	-	-	-	263.75 /hr	528	
			528					***528***	
General Requirements		***/ls***	***528***	***/ls***			***/ls***	***528***	
M007		***/ls***	***528***	***/ls***			***/ls***	***528***	
M008									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	9.88 hr	72.48 /hr	716	-	-	-	72.48 /hr	716	
			716					***716***	
General Requirements		***/ls***	***716***	***/ls***			***/ls***	***716***	
220000.00 Plumbing									
220523.20 Valves, Bronze									
Valves, bronze, ball, 150 psi, threaded, 1/2"	3.00 ea	70.88 /ea	213	24.41 /ea	73	-	95.29 /ea	286	
Valves, Bronze			***213***		***73***			***286***	
221113.23 Pipe, Copper									
Pipe cu solder jts, type L tubing, 1/2" dia. incld fittings and hangers	20.00 lf	23.10 /lf	462	10.46 /lf	209	-	33.55 /lf	671	
Pipe cu solder jts, type L tubing, 3/4" dia incld fittings and hangers	15.00 lf	24.62 /lf	369	15.95 /lf	239	-	40.56 /lf	608	
Pipe, Copper			***831***		***448***			***1,280***	
Plumbing		***/ls***	***1,044***	***/ls***	***522***		***/ls***	***1,565***	
230000.00 HVAC Components									
238413.10 Humidifiers									
Humidifiers, Canister type, Nortec NH-EL, 2kw, w/duct dispersion tube	3.00 ea	714.25 /ea	2,143	3,713.58 /ea	11,141	-	4,427.83 /ea	13,283	

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
Humidifiers			*2,143*		*11,141*			*13,283*	
HVAC Components		*/ls*	*2,143*	*/ls*	*11,141*		*/ls*	*13,283*	
260000.00 Electrical									
260519.90 Wire									
Wire, 600 volt, type THW, copper, stranded, #12 - power	0.90 clf	131.07 /clf	118	40.50 /clf	36	-	171.57 /clf	154	
Wire, 600 volt, type THW, copper, stranded, #12 - control	0.90 clf	131.08 /clf	118	40.49 /clf	36	-	171.57 /clf	154	
Wire			*236*		*73*			*309*	
260533.10 Conduit									
Conduit to 15' H, incl couplings only, elec metallic tubing, 1/2" dia - power	30.00 lf	3.32 /lf	99	1.19 /lf	36	-	4.51 /lf	135	
Conduit to 15' H, incl couplings only, elec metallic tubing, 1/2" dia - control	30.00 lf	3.32 /lf	99	1.20 /lf	36	-	4.51 /lf	135	
Conduit			*199*		*72*			*271*	
Electrical		*/ls*	*435*	*/ls*	*145*		*/ls*	*579*	
M008		***/ls***	***4,338***	***/ls***	***11,807***		***/ls***	***16,144***	
M008A									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	5.73 hr	72.48 /hr	415	-	-	-	72.48 /hr	415	
			415					*415*	
General Requirements		*/ls*	*415*	*/ls*			*/ls*	*415*	
110000.00 Equipment									
114813.10 Appliances									
Water Softener, Automatic, to 10 grains per gallon	1.00 ea	992.05 /ea	992	1,586.72 /ea	1,587	-	2,578.77 /ea	2,579	
Appliances			*992*		*1,587*			*2,579*	
Equipment		*/ls*	*992*	*/ls*	*1,587*		*/ls*	*2,579*	
220000.00 Plumbing									
220523.20 Valves, Bronze									
Valves, bronze, ball, 150 psi, threaded, 3/4"	4.00 ea	77.97 /ea	312	40.25 /ea	161	-	118.22 /ea	473	
Valves, Bronze			*312*		*161*			*473*	
220719.10 Piping Insulation									
Insulation, pipe coving, fbgl, W/all svce jkt, 1/2" wl, 3/4" IPS	20.00 lf	4.59 /lf	92	2.46 /lf	49	-	7.05 /lf	141	
Piping Insulation			*92*		*49*			*141*	
221113.23 Pipe, Copper									
Pipe cu solder jts, type L tubing, 3/4" dia incld fittings and hangers	20.00 lf	24.62 /lf	492	15.95 /lf	319	-	40.56 /lf	811	
Pipe, Copper			*492*		*319*			*811*	
Plumbing		*/ls*	*896*	*/ls*	*529*		*/ls*	*1,425*	
M008A			***2,303***		***2,116***			***4,419***	
M009									
010000.00 General Requirements									
013113.20									

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
013113.20									
Field personnel, misc labor, cleanup	21.71 hr	72.48 /hr	1,573	-	-	-	72.48 /hr	1,573	
			1,573					*1,573*	
General Requirements		*/ls*	*1,573*	*/ls*			*/ls*	*1,573*	
220000.00 Plumbing									
220505.10 Plumbing Labor									
Plumbing dml, piping, metal, 2" thru 3-1/2" dia	10.00 lf	10.40 /lf	104	-	-	-	10.40 /lf	104	
Plumbing Labor			*104*					*104*	
221113.44 Pipe, Steel									
Pipe st, sched 40, thrded, bk, 2" dia. incld fittings and hangers	10.00 lf	52.63 /lf	526	19.62 /lf	196	-	72.25 /lf	723	
Pipe, Steel			*526*		*196*			*723*	
Plumbing		*/ls*	*630*	*/ls*	*196*		*/ls*	*826*	
230000.00 HVAC Components									
230505.10 Mech Labor									
HVAC demo, central station air handler unit, up thru 15 ton	1.00 ea	1,785.63 /ea	1,786	-	-	422	2,207.63 /ea	2,208	D
Mech Labor			*1,786*			*422*		*2,208*	
237313.10 Air Handling Units									
Air handling unit, built-up, single zone, horiz/vert, 1600 CFM	1.00 ea	3,969.43 /ea	3,969	12,910.57 /ea	12,911	-	16,880.00 /ea	16,880	D
Air Handling Units			*3,969*		*12,911*			*16,880*	
HVAC Components		*/ls*	*5,755*	*/ls*	*12,911*	*422*	*/ls*	*19,088*	
260000.00 Electrical									
260590.10 Residential Wiring									
Electrician, labor - Reuse Electrical components	4.00 hr	180.25 /hr	721			-	180.25 /hr	721	
Residential Wiring			*721*					*721*	
Electrical		*/ls*	*721*	*/ls*			*/ls*	*721*	
26-28-16.00 Enclosed Switches And Circuit Breakers									
26-28-16.20 Safety Switches									
Disconnect switch, 3 pole fusible, 60 amp, to 30 HP motor, 600 volt	1.00 ea	224.44 /ea	224	1,823.53 /ea	1,824	-	2,047.97 /ea	2,048	
Safety Switches			*224*		*1,824*			*2,048*	
Enclosed Switches And Circuit Breakers			*224*		*1,824*			*2,048*	
M009		*/ls*	*8,904*	*/ls*	*14,930*	*422*	*/ls*	*24,257*	
M010									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	18.84 hr	72.48 /hr	1,365	-	-	-	72.48 /hr	1,365	
			1,365					*1,365*	
General Requirements		*/ls*	*1,365*	*/ls*			*/ls*	*1,365*	
220000.00 Plumbing									
220505.10 Plumbing Labor									
Plumbing dml, piping, metal, 2" thru 3-1/2" dia	10.00 lf	10.40 /lf	104	-	-	-	10.40 /lf	104	

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
Plumbing Labor			*104*					*104*	
221113.44 Pipe, Steel									
Pipe st, sched 40, thrded, bk, 2" dia. incld fittings and hangers	10.00 lf	52.63 /lf	526	19.62 /lf	196	-	72.25 /lf	723	
Pipe, Steel			*526*		*196*			*723*	
Plumbing		*/ls*	*630*	*/ls*	*196*		*/ls*	*826*	
230000.00 HVAC Components									
230505.10 Mech Labor									
HVAC demo, central station air handler unit, up thru 15 ton	1.00 ea	1,785.62 /ea	1,786	-	-	422	2,207.62 /ea	2,208	D
Mech Labor			*1,786*			*422*		*2,208*	
237313.10 Air Handling Units									
Air handling unit, built-up, single zone, horiz/vert, 1200 CFM	1.00 ea	2,977.20 /ea	2,977	9,682.87 /ea	9,683	-	12,660.07 /ea	12,660	D
Air Handling Units			*2,977*		*9,683*			*12,660*	
HVAC Components		*/ls*	*4,763*	*/ls*	*9,683*	*422*	*/ls*	*14,868*	
260000.00 Electrical									
260590.10 Residential Wiring									
Electrician, labor - Reuse Electrical components	4.00 hr	180.25 /hr	721			-	180.25 /hr	721	
Residential Wiring			*721*					*721*	
Electrical		*/ls*	*721*	*/ls*			*/ls*	*721*	
26-28-16.00 Enclosed Switches And Circuit Breakers									
26-28-16.20 Safety Switches									
Disconnect switch, 3 pole fusible, 60 amp, to 30 HP motor, 600 volt	1.00 ea	224.45 /ea	224	1,823.51 /ea	1,824	-	2,047.96 /ea	2,048	
Safety Switches			*224*		*1,824*			*2,048*	
Enclosed Switches And Circuit Breakers			*224*		*1,824*			*2,048*	
M010		*/ls*	*7,704*	*/ls*	*11,703*	*422*	*/ls*	*19,829*	
M011									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	2.33 hr	72.49 /hr	169	-	-	-	72.49 /hr	169	
			169					*169*	
General Requirements		*/ls*	*169*	*/ls*			*/ls*	*169*	
220000.00 Plumbing									
220505.10 Plumbing Labor									
Plumbing dml, piping insulation	20.00 lf	10.40 /lf	208	-	-	-	10.40 /lf	208	
Plumbing Labor			*208*					*208*	
220719.10 Piping Insulation									
Insulation, pipe covering, fbgls, all svce jkt, 1" wall, 2" IPS	20.00 lf	12.83 /lf	257	3.35 /lf	67	-	16.18 /lf	324	
Insulation, pipe covering, finishes, for .010" sst, add	20.00 sf	16.52 /sf	330	7.66 /sf	153	-	24.18 /sf	484	
Piping Insulation			*587*		*220*			*807*	
Plumbing		*/ls*	*795*	*/ls*	*220*		*/ls*	*1,015*	

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
M011		*/ls*	*964*	*/ls*	*220*		*/ls*	*1,184*	
02 Mechanical		*/ls*	*103,469*	*/ls*	*140,027*	*3,366*	*/ls*	*246,862*	
03 Plumbing									
P001									
220000.00 Plumbing									
220505.10 Plumbing Labor									
Plumbing Labor, Plumber, Foreman	20.00 hr	194.92 /hr	3,898			-	194.92 /hr	3,898	
Plumbing Labor, Plumber, Foreman, Video Scoping of Sanitary Sewer Lines, minimum 4-hour charge	16.00 hr	194.91 /hr	3,119			-	194.91 /hr	3,119	
Plumbing Labor			*7,017*					*7,017*	
Plumbing		*/ls*	*7,017*	*/ls*			*/ls*	*7,017*	
P001		*/ls*	*7,017*	*/ls*			*/ls*	*7,017*	
03 Plumbing		*/ls*	*7,017*	*/ls*			*/ls*	*7,017*	
04 Fire Protection									
F001									
280000.00 Electronic Safety and Security									
281616.50 Detection Devices									
Detection systems, Fire Alarm contractor	8.00 hr	132.30 /hr	1,058	137.15 /hr	1,097	-	269.45 /hr	2,156	
Detection Devices			*1,058*		*1,097*			*2,156*	
Electronic Safety and Security		*/ls*	*1,058*	*/ls*	*1,097*		*/ls*	*2,156*	
F001		*/ls*	*1,058*	*/ls*	*1,097*		*/ls*	*2,156*	
F002									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	51.24 hr	72.48 /hr	3,714	-	-	-	72.48 /hr	3,714	
			3,714					*3,714*	
General Requirements		*/ls*	*3,714*	*/ls*			*/ls*	*3,714*	
030000.00 Concrete									
038213.10 Core Drilling									
Drilling,core,CMU/Brick Wall,w/bit,layout&setup,4"diam core	1.00 ea	205.06 /ea	205	15.13 /ea	15	19	238.85 /ea	239	
Core Drilling			*205*		*15*	*19*		*239*	
Concrete		*/ls*	*205*	*/ls*	*15*	*19*	*/ls*	*239*	
220000.00 Plumbing									
221113.44 Pipe, Steel									
Pipe st, sched 40, thrded, bk, 4" dia, incld fittings and hangers	130.00 lf	93.55 /lf	12,162	58.26 /lf	7,574	-	151.81 /lf	19,736	
Pipe, Steel			*12,162*		*7,574*			*19,736*	
Plumbing		*/ls*	*12,162*	*/ls*	*7,574*		*/ls*	*19,736*	
21-11-19.00 Fire-Department Connections									
21-11-19.50 Connections For The Fire-Department									
Standpipe connections, wall, with plugs & chains, single, flush, brass, 2-1/2" x 2-1/2"	5.00 ea	249.69 /ea	1,248	449.30 /ea	2,247	-	698.99 /ea	3,495	

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
21-11-19.50 Connections For The Fire-Department									
Fire Hose & Equipment, standpipe connections, with plugs & chains, sidewalk siamese unit, polished brass, 3 way, 2-1/2" x 2-1/2" x 2-1/2"x 6"	2.00 ea	624.21 /ea	1,248	2,214.75 /ea	4,429	-	2,838.96 /ea	5,678	
Connections For The Fire-Department			*2,497*		*6,676*			*9,173*	
Fire-Department Connections			*2,497*		*6,676*			*9,173*	
F002		*/ls*	*18,578*	*/ls*	*14,265*	*19*	*/ls*	*32,861*	
04 Fire Protection		*/ls*	*19,636*	*/ls*	*15,362*	*19*	*/ls*	*35,017*	
05 Electrical									
E001A									
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									
Panelboards, 1 phase 3 wire, main circuit breaker, 208/120 V, 100 amp, 30 circuits, NQOD, incl 20 A 1 pole plug-in breakers	2.00 ea	1,907.57 /ea	3,815	3,478.84 /ea	6,958	-	5,386.41 /ea	10,773	
Labor	16.00 hr	127.17 /hr	2,035			-	127.17 /hr	2,035	
Panelboards Commercial Applications			*5,850*		*6,958*			*12,808*	
Panelboards			*5,850*		*6,958*			*12,808*	
E001A		*/*****	*5,850*	*/*****	*6,958*		*/*****	*12,808*	
E001B									
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									
Labor	16.00 hr	127.17 /hr	2,035			-	127.17 /hr	2,035	
Panelboards, 3 phase 4 wire, main circuit breaker, 120/208 V, 225 amp, 42 circuits, NQOD, incl 20 A 1 pole plug-in breakers	1.00 ea	2,797.80 /ea	2,798	4,536.50 /ea	4,537	-	7,334.30 /ea	7,334	D
Panelboards, 3 phase 4 wire, main circuit breaker, 208/120 V, 225 amp, 42 circuits, NQOD, incl 20 A 1 pole plug-in breakers	1.00 ea	2,861.36 /ea	2,861	4,747.50 /ea	4,748	-	7,608.86 /ea	7,609	D
Panelboards Commercial Applications			*7,694*		*9,284*			*16,978*	
Panelboards			*7,694*		*9,284*			*16,978*	
E001B			*7,694*		*9,284*			*16,978*	
E002B									
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									
Panelboards, 1 phase 3 wire, main circuit breaker, 120/240 V, 125 amp, 18 circuits, NQOD, incl 20 A 1 pole plug-in breakers	1.00 ea	1,653.22 /ea	1,653	3,059.50 /ea	3,060	-	4,712.72 /ea	4,713	
Panelboards, 1 phase 3 wire, main circuit breaker, 120/240 V, 125 amp, 30 circuits, NQOD, incl 20 A 1 pole plug-in breakers	1.00 ea	2,034.76 /ea	2,035	3,692.50 /ea	3,693	-	5,727.26 /ea	5,727	
Labor	16.00 hr	127.17 /hr	2,035			-	127.17 /hr	2,035	
Panelboards Commercial Applications			*5,723*		*6,752*			*12,475*	
Panelboards			*5,723*		*6,752*			*12,475*	

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
E002B			*5,723*		*6,752*			*12,475*	
E003A									
26-05-19.00 Low-Voltage Electrical Power Conductors And Cables									
26-05-19.90 Wire									
Wire, copper, solid, 600 volt, #10, type THWN-THHN, in raceway	0.15 clf	101.67 /clf	15	48.87 /clf	7	-	150.50 /clf	23	
Wire			*15*		*7*			*23*	
Low-Voltage Electrical Power Conductors And Cables			*15*		*7*			*23*	
26-05-33.00 Raceway And Boxes For Electrical Systems									
26-05-33.05 Conduit									
Rigid galvanized steel conduit, 3/4" diameter, to 15' H, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	10.00 lf	12.72 /lf	127	7.75 /lf	78	-	20.47 /lf	205	
Conduit			*127*		*78*			*205*	
Raceway And Boxes For Electrical Systems			*127*		*78*			*205*	
26-24-16.00 Panelboards									
26-24-16.20 Panelboard And Load Center Circuit Breakers									
Circuit breakers, bolt-on, 10 k A I.C., 3 pole, 240 volt, 15 to 60 amp	1.00 ea	164.07 /ea	164	257.52 /ea	258	-	421.59 /ea	422	
Panelboard And Load Center Circuit Breakers			*164*		*258*			*422*	
26-24-16.30 Panelboards Commercial Applications									
Labor	2.00 hr	127.17 /hr	254			-	127.17 /hr	254	
Panelboards Commercial Applications			*254*					*254*	
Panelboards			*418*		*258*			*676*	
26-28-16.00 Enclosed Switches And Circuit Breakers									
26-35-26.40 Transient Voltage Suppressor Transformer									
Transient voltage suppressor for panels	1.00 ea	381.51 /ea	382	2,142.38 /ea	2,142	-	2,523.89 /ea	2,524	
Transient Voltage Suppressor Transformer			*382*		*2,142*			*2,524*	
Enclosed Switches And Circuit Breakers			*382*		*2,142*			*2,524*	
E003A			*942*		*2,485*			*3,427*	
E003B									
26-05-19.00 Low-Voltage Electrical Power Conductors And Cables									
26-05-19.90 Wire									
Wire, copper, solid, 600 volt, #10, type THWN-THHN, in raceway	0.30 clf	101.77 /clf	31	49.00 /clf	15	-	150.77 /clf	45	
Wire			*31*		*15*			*45*	
Low-Voltage Electrical Power Conductors And Cables			*31*		*15*			*45*	
26-05-33.00 Raceway And Boxes For Electrical Systems									
26-05-33.05 Conduit									
Rigid galvanized steel conduit, 3/4" diameter, to 15' H, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	10.00 lf	12.72 /lf	127	7.75 /lf	78	-	20.47 /lf	205	
Conduit			*127*		*78*			*205*	
Raceway And Boxes For Electrical Systems			*127*		*78*			*205*	
26-24-16.00 Panelboards									
26-24-16.20 Panelboard And Load Center Circuit Breakers									

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
26-24-16.20 Panelboard And Load Center Circuit Breakers									
Circuit breakers, bolt-on, 10 k A I.C., 3 pole, 240 volt, 15 to 60 amp	3.00 ea	164.09 /ea	492	257.50 /ea	773	-	421.59 /ea	1,265	
Panelboard And Load Center Circuit Breakers			*492*		*773*			*1,265*	
26-24-16.30 Panelboards Commercial Applications									
Labor	6.00 hr	127.18 /hr	763			-	127.18 /hr	763	
Panelboards Commercial Applications			*763*					*763*	
Panelboards			*1,255*		*773*			*2,028*	
26-28-16.00 Enclosed Switches And Circuit Breakers									
26-35-26.40 Transient Voltage Suppressor Transformer									
Transient voltage suppressor for panels	3.00 ea	381.51 /ea	1,145	2,142.38 /ea	6,427	-	2,523.89 /ea	7,572	
Transient Voltage Suppressor Transformer			*1,145*		*6,427*			*7,572*	
Enclosed Switches And Circuit Breakers			*1,145*		*6,427*			*7,572*	
E003B			***2,558***		***7,292***			***9,849***	
E004A									
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									
Labor	1.00 hr	127.19 /hr	127			-	127.19 /hr	127	
Panelboards Commercial Applications			*127*					*127*	
Panelboards			*127*					*127*	
E004A		***/****	***127***	***/****			***/****	***127***	
E005A									
26-05-19.00 Low-Voltage Electrical Power Conductors And Cables									
26-05-19.90 Wire									
Wire, copper, solid, 600 volt, #10, type THWN-THHN, in raceway	1.50 clf	101.73 /clf	153	48.89 /clf	73	-	150.62 /clf	226	
Wire			*153*		*73*			*226*	
Low-Voltage Electrical Power Conductors And Cables			*153*		*73*			*226*	
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									
Labor	3.00 hr	127.17 /hr	382			-	127.17 /hr	382	
Panelboards Commercial Applications			*382*					*382*	
Panelboards			*382*					*382*	
E005A		***/****	***534***	***/****	***73***		***/****	***607***	
E006A									
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									
Labor to remove circuits	9.00 hr	127.17 /hr	1,145			-	127.17 /hr	1,145	
Panelboards Commercial Applications			*1,145*					*1,145*	
Panelboards			*1,145*					*1,145*	
E006A		***/****	***1,145***	***/****			***/****	***1,145***	
E007A									
26-24-16.00 Panelboards									
26-24-16.20 Panelboard And Load Center Circuit Breakers									
Circuit breakers, bolt-on, 10 k A I.C., 2 pole, 240 volt, 15 to 50 amp	2.00 ea	127.18 /ea	254	113.33 /ea	227	-	240.51 /ea	481	

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
Panelboard And Load Center Circuit Breakers			*254*		*227*			*481*	
Panelboards			*254*		*227*			*481*	
E007A		*/*****	*254*	*/*****	*227*		*/*****	*481*	
E007B									
26-24-16.00 Panelboards									
26-24-16.20 Panelboard And Load Center Circuit Breakers									
Circuit breakers, bolt-on, 10 k A I.C., 2 pole, 240 volt, 15 to 50 amp	3.00 ea	127.17 /ea	382	113.35 /ea	340	-	240.52 /ea	722	
Panelboard And Load Center Circuit Breakers			*382*		*340*			*722*	
Panelboards			*382*		*340*			*722*	
E007B		*/ls*	*382*	*/ls*	*340*		*/ls*	*722*	
E008A									
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									
Labor	1.00 hr	127.17 /hr	127			-	127.17 /hr	127	
Panelboards Commercial Applications			*127*					*127*	
Panelboards			*127*					*127*	
E008A		*/*****	*127*	*/*****			*/*****	*127*	
E010A									
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									
Labor	4.00 hr	127.17 /hr	509			-	127.17 /hr	509	
Panelboards Commercial Applications			*509*					*509*	
Panelboards			*509*					*509*	
E010A		*/*****	*509*	*/*****			*/*****	*509*	
E010B									
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									
Labor	1.00 hr	127.18 /hr	127			-	127.18 /hr	127	
Panelboards Commercial Applications			*127*					*127*	
Panelboards			*127*					*127*	
E010B			*127*					*127*	
E012A									
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									
Panelboards, add new door in door and remove existing door	8.00 ea	63.59 /ea	509	846.75 /ea	6,774	-	910.34 /ea	7,283	
Panelboards Commercial Applications			*509*		*6,774*			*7,283*	
Panelboards			*509*		*6,774*			*7,283*	
E012A		*/*****	*509*	*/*****	*6,774*		*/*****	*7,283*	
E012B									
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									
Panelboards, add new door in door and remove existing door	4.00 ea	63.59 /ea	254	846.75 /ea	3,387	-	910.34 /ea	3,641	

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
Panelboards Commercial Applications			*254*		*3,387*			*3,641*	
Panelboards			*254*		*3,387*			*3,641*	
E012B			*254*		*3,387*			*3,641*	
E013A									
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									
Knock out Covers	3.00 ea	63.59 /ea	191	2.90 /ea	9	-	66.49 /ea	199	
Panelboards Commercial Applications			*191*		*9*			*199*	
Panelboards			*191*		*9*			*199*	
E013A			*191*		*9*			*199*	
E013B									
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									
Knock out Covers	1.00 ea	63.62 /ea	64	2.88 /ea	3	-	66.50 /ea	67	
Panelboards Commercial Applications			*64*		*3*			*67*	
Panelboards			*64*		*3*			*67*	
E013B			*64*		*3*			*67*	
E014A									
26-05-33.00 Raceway And Boxes For Electrical Systems									
26-05-33.25 Conduit Fittings For Rigid Galvanized Steel									
Conduit fittings compression	5.00 ea	127.18 /ea	636	193.59 /ea	968	-	320.77 /ea	1,604	
Conduit Fittings For Rigid Galvanized Steel			*636*		*968*			*1,604*	
Raceway And Boxes For Electrical Systems			*636*		*968*			*1,604*	
E014A		*/****	*636*	*/****	*968*		*/****	*1,604*	
E014B									
26-05-33.00 Raceway And Boxes For Electrical Systems									
26-05-33.25 Conduit Fittings For Rigid Galvanized Steel									
Conduit fittings compression	6.00 ea	127.18 /ea	763	193.59 /ea	1,162	-	320.76 /ea	1,925	
Conduit Fittings For Rigid Galvanized Steel			*763*		*1,162*			*1,925*	
Raceway And Boxes For Electrical Systems			*763*		*1,162*			*1,925*	
E014B			*763*		*1,162*			*1,925*	
E015A									
26-05-33.00 Raceway And Boxes For Electrical Systems									
26-05-33.13 Conduit									
Rigid galvanized steel conduit, 1" diameter, to 10' H, incl 2 terminations, 2 elbows, 11 beam clamps, and 11 couplings per 100 LF	30.00 lf	15.65 /lf	470	15.82 /lf	475	-	31.48 /lf	944	
Conduit			*470*		*475*			*944*	
Raceway And Boxes For Electrical Systems			*470*		*475*			*944*	
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									
Labor	1.00 hr	127.16 /hr	127			-	127.16 /hr	127	
Panelboards Commercial Applications			*127*					*127*	
Panelboards			*127*					*127*	
E015A		*/****	*597*	*/****	*475*		*/****	*1,071*	
E016A									

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									
Ground Bus	1.00 ea	254.32 /ea	254	147.70 /ea	148	-	402.02 /ea	402	
Labor	2.00 hr	127.17 /hr	254			-	127.17 /hr	254	
Panelboards Commercial Applications			***509***		***148***			***656***	
Panelboards			***509***		***148***			***656***	
E016A			***509***		***148***			***656***	
E017A									
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									
Labor	1.00 hr	127.17 /hr	127			-	127.17 /hr	127	
Panelboards Commercial Applications			***127***					***127***	
Panelboards			***127***					***127***	
E017A		***/****	***127***	***/****			***/****	***127***	
E018A									
26-05-33.00 Raceway And Boxes For Electrical Systems									
26-05-33.25 Conduit Fittings For Rigid Galvanized Steel									
Conduit fittings for rigid galvanized steel, grounding bushing, insulated, 3/4" diameter	3.00 ea	36.34 /ea	109	11.45 /ea	34	-	47.78 /ea	143	
Conduit Fittings For Rigid Galvanized Steel			***109***		***34***			***143***	
Raceway And Boxes For Electrical Systems			***109***		***34***			***143***	
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									
Labor	3.00 hr	127.17 /hr	382			-	127.17 /hr	382	
Panelboards Commercial Applications			***382***					***382***	
Panelboards			***382***					***382***	
E018A		***/****	***491***	***/****	***34***		***/****	***525***	
E019A									
26-05-19.00 Low-Voltage Electrical Power Conductors And Cables									
26-05-19.90 Wire									
Wire, color code feeder circuit wires 10 circuits	3.00 ea	12.71 /ea	38	2.92 /ea	9	-	15.63 /ea	47	
Wire			***38***		***9***			***47***	
Low-Voltage Electrical Power Conductors And Cables			***38***		***9***			***47***	
E019A		***/****	***38***	***/****	***9***		***/****	***47***	
E020A									
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									
Provide typewritten panel schedules	8.00 ea	50.87 /ea	407	42.85 /ea	343	-	93.72 /ea	750	
Labor	16.00 hr	127.17 /hr	2,035			-	127.17 /hr	2,035	
Panelboards Commercial Applications			***2,442***		***343***			***2,784***	
Panelboards			***2,442***		***343***			***2,784***	
E020A		***/****	***2,442***	***/****	***343***		***/****	***2,784***	
E020B									
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									
Provide typewritten panel schedules	4.00 ea	50.87 /ea	203	42.85 /ea	171	-	93.72 /ea	375	

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
26-24-16.30 Panelboards Commercial Applications									
Labor	8.00 hr	127.17 /hr	1,017			-	127.17 /hr	1,017	
Panelboards Commercial Applications			*1,221*		*171*			*1,392*	
Panelboards			*1,221*		*171*			*1,392*	
E020B			***1,221***		***171***			***1,392***	
E021									
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									
Seal conduit	1.00 ea	254.34 /ea	254	42.20 /ea	42	-	296.54 /ea	297	
Panelboards Commercial Applications			*254*		*42*			*297*	
Panelboards			*254*		*42*			*297*	
E021		***/ls***	***254***	***/ls***	***42***		***/ls***	***297***	
E022									
26-05-26.00 Grounding And Bonding For Electrical Systems									
26-05-26.80 Grounding									
Trenching	10.00 lf	2.54 /lf	25	5.10 /lf	51	-	7.64 /lf	76	
Grounding			*25*		*51*			*76*	
Grounding And Bonding For Electrical Systems			*25*		*51*			*76*	
26-28-16.00 Enclosed Switches And Circuit Breakers									
26-41-13.13 Lightning Protection For Buildings									
Lightning protection labor	1.00 ea	7,630.31 /ea	7,630	1,899.00 /ea	1,899	-	9,529.31 /ea	9,529	
Lightning protection cable, Class II Cable	330.00 lf	4.62 /lf	1,523	5.41 /lf	1,784	-	10.02 /lf	3,308	
Lightning Protection For Buildings			*9,154*		*3,683*			*12,837*	
Enclosed Switches And Circuit Breakers			*9,154*		*3,683*			*12,837*	
E022		***/ls***	***9,179***	***/ls***	***3,734***		***/ls***	***12,913***	
E023									
26-28-16.00 Enclosed Switches And Circuit Breakers									
26-41-13.13 Lightning Protection For Buildings									
Lightning protection labor	1.00 ea	3,815.17 /ea	3,815	1,055.00 /ea	1,055	-	4,870.17 /ea	4,870	
Lightning protection cable, Class II Cable	400.00 lf	4.62 /lf	1,847	5.41 /lf	2,163	-	10.02 /lf	4,009	D
Lightning Protection For Buildings			*5,662*		*3,218*			*8,879*	
Enclosed Switches And Circuit Breakers			*5,662*		*3,218*			*8,879*	
E023		***/ls***	***5,662***	***/ls***	***3,218***		***/ls***	***8,879***	
E024									
26-05-26.00 Grounding And Bonding For Electrical Systems									
26-05-26.80 Grounding									
Bond items	15.00 ea	254.34 /ea	3,815	102.02 /ea	1,530	-	356.36 /ea	5,345	
Grounding			*3,815*		*1,530*			*5,345*	
Grounding And Bonding For Electrical Systems			*3,815*		*1,530*			*5,345*	
E024		***/ls***	***3,815***	***/ls***	***1,530***		***/ls***	***5,345***	
E025									
26-05-26.00 Grounding And Bonding For Electrical Systems									
26-05-26.80 Grounding									
Bond items	20.00 ea	254.34 /ea	5,087	102.02 /ea	2,040	-	356.36 /ea	7,127	
Grounding			*5,087*		*2,040*			*7,127*	

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
Grounding And Bonding For Electrical Systems			*5,087*		*2,040*			*7,127*	
E025		*/ls*	*5,087*	*/ls*	*2,040*		*/ls*	*7,127*	
E026									
26-28-16.00 Enclosed Switches And Circuit Breakers									
26-41-13.13 Lightning Protection For Buildings									
Air terminal and base, aluminum, 1/2" dia x 24", to 75' h	24.00 ea	139.37 /ea	3,345	53.17 /ea	1,276	-	192.54 /ea	4,621	
Lightning protection labor	1.00 ea	1,526.07 /ea	1,526	211.00 /ea	211	-	1,737.07 /ea	1,737	
Lightning protection cable, Class II Cable	420.00 lf	4.62 /lf	1,939	5.41 /lf	2,271	-	10.02 /lf	4,210	
Lightning Protection For Buildings			*6,810*		*3,758*			*10,568*	
Enclosed Switches And Circuit Breakers			*6,810*		*3,758*			*10,568*	
E026		*/ls*	*6,810*	*/ls*	*3,758*		*/ls*	*10,568*	
E028									
26-05-26.00 Grounding And Bonding For Electrical Systems									
26-05-26.80 Grounding									
Bonding Jumper #6 wire Racks	11.00 ea	165.33 /ea	1,819	42.20 /ea	464	-	207.53 /ea	2,283	
Grounding			*1,819*		*464*			*2,283*	
Grounding And Bonding For Electrical Systems			*1,819*		*464*			*2,283*	
E028		*/ls*	*1,819*	*/ls*	*464*		*/ls*	*2,283*	
E029									
26-05-26.00 Grounding And Bonding For Electrical Systems									
26-05-26.80 Grounding									
Grounding, plate	4.00 ea	508.70 /ea	2,035	164.81 /ea	659	-	673.51 /ea	2,694	
Grounding Labor	4.00 hr	127.18 /hr	509			-	127.18 /hr	509	
Grounding			*2,544*		*659*			*3,203*	
Grounding And Bonding For Electrical Systems			*2,544*		*659*			*3,203*	
E029		*/ls*	*2,544*	*/ls*	*659*		*/ls*	*3,203*	
E030									
26-05-26.00 Grounding And Bonding For Electrical Systems									
26-05-26.80 Grounding									
Grounding Labor	3.00 hr	127.17 /hr	382			-	127.17 /hr	382	
Grounding			*382*					*382*	
Grounding And Bonding For Electrical Systems			*382*					*382*	
E030		*/ls*	*382*	*/ls*			*/ls*	*382*	
E031									
26-05-26.00 Grounding And Bonding For Electrical Systems									
26-05-26.80 Grounding									
Grounding Labor	2.00 hr	127.16 /hr	254			-	127.16 /hr	254	
Insulated ground wire, copper, stranded, 4/0	0.70 clf	462.49 /clf	324	785.53 /clf	550	-	1,248.01 /clf	874	
Grounding			*578*		*550*			*1,128*	
Grounding And Bonding For Electrical Systems			*578*		*550*			*1,128*	
E031		*/ls*	*578*	*/ls*	*550*		*/ls*	*1,128*	
E032									
26-05-26.00 Grounding And Bonding For Electrical Systems									
26-05-26.80 Grounding									

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
26-05-26.80 Grounding									
Grounding, plate cover	2.00 ea	127.16 /ea	254	31.65 /ea	63	-	158.81 /ea	318	
Grounding			*254*		*63*			*318*	
Grounding And Bonding For Electrical Systems			*254*		*63*			*318*	
E032		***/ls***	***254***	***/ls***	***63***		***/ls***	***318***	
E033									
26-05-26.00 Grounding And Bonding For Electrical Systems									
26-05-26.80 Grounding									
Grounding, plate cover	1.00 ea	127.22 /ea	127	31.65 /ea	32	-	158.87 /ea	159	
Grounding Labor	1.00 hr	127.17 /hr	127			-	127.17 /hr	127	
Grounding			*254*		*32*			*286*	
Grounding And Bonding For Electrical Systems			*254*		*32*			*286*	
E033		***/ls***	***254***	***/ls***	***32***		***/ls***	***286***	
E034									
26-05-19.00 Low-Voltage Electrical Power Conductors And Cables									
26-05-19.90 Wire									
Wire, copper, solid, 600 volt, #12, type THWN-THHN, in raceway	10.20 clf	92.49 /clf	943	31.00 /clf	316	-	123.49 /clf	1,260	
Wire			*943*		*316*			*1,260*	
Low-Voltage Electrical Power Conductors And Cables			*943*		*316*			*1,260*	
26-05-33.00 Raceway And Boxes For Electrical Systems									
26-05-33.05 Conduit									
Electric metallic tubing (EMT), 3/4" diameter, to 15' high, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	340.00 lf	7.83 /lf	2,661	2.80 /lf	953	-	10.63 /lf	3,614	
Conduit			*2,661*		*953*			*3,614*	
Raceway And Boxes For Electrical Systems			*2,661*		*953*			*3,614*	
26-28-16.00 Enclosed Switches And Circuit Breakers									
26-51-13.50 Interior Lighting Fixtures									
Lighting Labor	17.00 hr	127.17 /hr	2,162			-	127.17 /hr	2,162	
NewCFL light fixtures	17.00 ea	178.04 /ea	3,027	272.19 /ea	4,627	-	450.23 /ea	7,654	
Interior Lighting Fixtures			*5,189*		*4,627*			*9,816*	
Enclosed Switches And Circuit Breakers			*5,189*		*4,627*			*9,816*	
E034		***/ls***	***8,793***	***/ls***	***5,896***		***/ls***	***14,689***	
E035									
26-56-23.00 Area Lighting									
26-61-23.10 Lamps									
Fluorescent lamp, energy saver, 32 watt, 4' long, T8	9.00 ea	38.15 /ea	343	10.11 /ea	91	-	48.26 /ea	434	
Lamps			*343*		*91*			*434*	
Area Lighting			*343*		*91*			*434*	
E035		***/ls***	***343***	***/ls***	***91***		***/ls***	***434***	
E036									
26-28-16.00 Enclosed Switches And Circuit Breakers									
26-51-13.50 Interior Lighting Fixtures									
Replace T12 Fixtures with New T8 light fixtures	23.00 ea	178.04 /ea	4,095	272.19 /ea	6,260	-	450.23 /ea	10,355	D
Lighting Labor	23.00 hr	127.17 /hr	2,925			-	127.17 /hr	2,925	

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
Interior Lighting Fixtures			*7,020*		*6,260*			*13,280*	
Enclosed Switches And Circuit Breakers			*7,020*		*6,260*			*13,280*	
E036		*/ls*	*7,020*	*/ls*	*6,260*		*/ls*	*13,280*	
E037									
26-56-23.00 Area Lighting									
26-61-23.10 Lamps									
Fluorescent lamp, CFL	38.00 ea	12.72 /ea	483	35.26 /ea	1,340	-	47.98 /ea	1,823	
Lamps			*483*		*1,340*			*1,823*	
Area Lighting			*483*		*1,340*			*1,823*	
E037		*/ls*	*483*	*/ls*	*1,340*		*/ls*	*1,823*	
E038									
26-28-16.00 Enclosed Switches And Circuit Breakers									
26-51-13.50 Interior Lighting Fixtures									
Lighting wire guards CFL	10.00 ea	76.31 /ea	763	36.93 /ea	369	-	113.23 /ea	1,132	
Interior Lighting Fixtures			*763*		*369*			*1,132*	
Enclosed Switches And Circuit Breakers			*763*		*369*			*1,132*	
E038		*/ls*	*763*	*/ls*	*369*		*/ls*	*1,132*	
E039									
26-05-19.00 Low-Voltage Electrical Power Conductors And Cables									
26-05-19.90 Wire									
Wire, copper, solid, 600 volt, #12, type THWN-THHN, in raceway	0.60 clf	92.47 /clf	55	31.07 /clf	19	-	123.53 /clf	74	
Wire			*55*		*19*			*74*	
Low-Voltage Electrical Power Conductors And Cables			*55*		*19*			*74*	
26-05-33.00 Raceway And Boxes For Electrical Systems									
26-05-33.05 Conduit									
Electric metallic tubing (EMT), 3/4" diameter, to 15' high, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	20.00 lf	7.83 /lf	156	2.80 /lf	56	-	10.63 /lf	213	
Conduit			*156*		*56*			*213*	
Raceway And Boxes For Electrical Systems			*156*		*56*			*213*	
26-28-16.00 Enclosed Switches And Circuit Breakers									
26-53-13.10 Exit Lighting Fixtures									
Exit lighting, L.E.D. standard, single face, ceiling or wall mount Replace existing	1.00 ea	203.46 /ea	203	285.66 /ea	286	-	489.12 /ea	489	
Exit Lighting Fixtures			*203*		*286*			*489*	
Enclosed Switches And Circuit Breakers			*203*		*286*			*489*	
E039		*/ls*	*415*	*/ls*	*360*		*/ls*	*776*	
E040									
26-28-16.00 Enclosed Switches And Circuit Breakers									
26-51-13.50 Interior Lighting Fixtures									
Lighting Labor	1.00 hr	127.17 /hr	127			-	127.17 /hr	127	
Interior Lighting Fixtures			*127*					*127*	
26-52-13.10 Emergency Lighting And Battery Units									

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
26-52-13.10 Emergency Lighting And Battery Units									
Emergency lighting units, lead battery operated, twin sealed beam light, 25 W, 6 V each w/built in exit	1.00 ea	279.79 /ea	280	559.15 /ea	559	-	838.94 /ea	839	D
Emergency Lighting And Battery Units			*280*		*559*			*839*	
Enclosed Switches And Circuit Breakers			*407*		*559*			*966*	
E040		*/ls*	*407*	*/ls*	*559*		*/ls*	*966*	
E041									
26-05-19.00 Low-Voltage Electrical Power Conductors And Cables									
26-05-19.90 Wire									
Wire, copper, solid, 600 volt, #12, type THWN-THHN, in raceway	6.00 clf	92.49 /clf	555	31.00 /clf	186	-	123.49 /clf	741	
Wire			*555*		*186*			*741*	
Low-Voltage Electrical Power Conductors And Cables			*555*		*186*			*741*	
26-05-33.00 Raceway And Boxes For Electrical Systems									
26-05-33.05 Conduit									
Electric metallic tubing (EMT), 3/4" diameter, to 15' high, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	200.00 lf	7.83 /lf	1,565	2.80 /lf	560	-	10.63 /lf	2,126	
Conduit			*1,565*		*560*			*2,126*	
Raceway And Boxes For Electrical Systems			*1,565*		*560*			*2,126*	
26-28-16.00 Enclosed Switches And Circuit Breakers									
26-51-13.50 Interior Lighting Fixtures									
Replace track lights with task lights	10.00 ea	178.04 /ea	1,780	358.74 /ea	3,587	-	536.77 /ea	5,368	
Interior Lighting Fixtures			*1,780*		*3,587*			*5,368*	
Enclosed Switches And Circuit Breakers			*1,780*		*3,587*			*5,368*	
E041		*/ls*	*3,901*	*/ls*	*4,334*		*/ls*	*8,234*	
05 Electrical		*/ls*	*92,574*	*/ls*	*82,193*		*/ls*	*174,767*	
01 ATCT		***/ls***	***906,065***	***/ls***	***926,901***	***26,307***	***/ls***	***1,860,160***	
02 BASE BUILDING									
01 Architectural									
A054									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	30.00 hr	72.48 /hr	2,174	-	-	-	72.48 /hr	2,174	
			2,174					*2,174*	
General Requirements		*/ls*	*2,174*	*/ls*			*/ls*	*2,174*	
070000.00 Thermal and Moisture Protection									
078413.10 Firestopping									
Firestopping, Wall Opening	60.00 ea	158.75 /ea	9,525	16.88 /ea	1,013	-	175.63 /ea	10,538	
Firestopping			*9,525*		*1,013*			*10,538*	
Thermal and Moisture Protection		*/ls*	*9,525*	*/ls*	*1,013*		*/ls*	*10,538*	
A054		*/ls*	*11,699*	*/ls*	*1,013*		*/ls*	*12,712*	
A055									

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	18.59 hr	72.48 /hr	1,347	-	-	-	72.48 /hr	1,347	
			1,347					*1,347*	
General Requirements		***/ls***	***1,347***	***/ls***			***/ls***	***1,347***	
070000.00 Thermal and Moisture Protection									
078413.10 Firestopping									
Firestopping, constr jt, concrete/wall joints, 1" wide	100.00 lf	12.70 /lf	1,270	15.86 /lf	1,586	-	28.56 /lf	2,856	
Firestopping			***1,270***		***1,586***			***2,856***	
Thermal and Moisture Protection		***/ls***	***1,270***	***/ls***	***1,586***		***/ls***	***2,856***	
080000.00 Openings									
080505.10 Selective Demolition									
Remove Door, Frame and Hardware	1.00 ea	237.46 /ea	237	11.26 /ea	11	-	248.72 /ea	249	
Selective Demolition			***237***		***11***			***249***	
081213.13 Standard Hollow Metal Frames									
Steel frames knock down, 14 ga, "C" label, 5.75" D, 7' H, 3' W, sgl	1.00 ea	169.33 /ea	169	271.81 /ea	272	-	441.14 /ea	441	
Standard Hollow Metal Frames			***169***		***272***			***441***	
081313.15 Metal Doors									
Fire door, st, flush, "C" lbl 45 min., cmpst, 20 Ga., 3'-0" x 7'-0"	1.00 ea	158.78 /ea	159	877.21 /ea	877	-	1,035.99 /ea	1,036	
Metal Doors			***159***		***877***			***1,036***	
087120.15 Hardware									
Average, door hardware set, Single, "C" label, U.L. Listed, Fire Rated	1.00 door	412.75 /door	413	1,107.75 /door	1,108	-	1,520.50 /door	1,521	
Hardware			***413***		***1,108***			***1,521***	
087120.31 Door Closers									
Door Closer, surface mounted, heavy duty, fusible link arm, U.L. Listed for "C" Label Door	1.00 ea	238.14 /ea	238	770.15 /ea	770	-	1,008.29 /ea	1,008	
Door Closers			***238***		***770***			***1,008***	
087120.90 Hinges									
Hinges, full mortise, hi frequency, SS base, 4-1/2" x 4-1/2", us32	2.00 pr	-	-	269.77 /pr	540	-	269.77 /pr	540	
Hinges					***540***			***540***	
087120.95 Kick Plates									
Kick plate, 6" high, for 3' door, bronze	1.00 ea	84.65 /ea	85	91.13 /ea	91	-	175.78 /ea	176	
Kick Plates			***85***		***91***			***176***	
Openings		***/ls***	***1,301***	***/ls***	***3,669***		***/ls***	***4,970***	
090000.00 Finishes									
092910.30 Misc Carpentry									
Patch and Repair GWB Wall	100.00 sf	13.23 /sf	1,323	2.30 /sf	230	-	15.53 /sf	1,553	
Misc Carpentry			***1,323***		***230***			***1,553***	
099123.35 Doors & Windows									
Prepare, Prime and Paint Wood or Metal Doors and Frames	50.00 sf	9.44 /sf	472	0.32 /sf	16	-	9.76 /sf	488	

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
Doors & Windows			*472*		*16*			*488*	
099123.72 Walls And Ceilings									
Prepare, Prime and Paint GWB Walls	200.00 sf	5.02 /sf	1,003	0.72 /sf	143	-	5.73 /sf	1,146	
Walls And Ceilings			*1,003*		*143*			*1,146*	
Finishes		*/ls*	*2,798*	*/ls*	*389*		*/ls*	*3,187*	
100000.00 Specialties									
101423.13 Specialities									
Install "Fire Rated Partition" Signage above ceilings, either spray on with stencil or Plastic pre-printed	5.00 ea	31.79 /ea	159	47.48 /ea	237	-	79.27 /ea	396	
Specialities			*159*		*237*			*396*	
Specialties		*/ls*	*159*	*/ls*	*237*		*/ls*	*396*	
A055		*/ls*	*6,875*	*/ls*	*5,881*		*/ls*	*12,756*	
A056									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	1.80 hr	72.47 /hr	130	-	-	-	72.47 /hr	130	
			130					*130*	
General Requirements		*/ls*	*130*	*/ls*			*/ls*	*130*	
260000.00 Electrical									
260519.90 Wire									
Wire, 600 volt, type THW, copper, stranded, #12 - power	0.90 clf	131.10 /clf	118	40.49 /clf	36	-	171.59 /clf	154	
Wire			*118*		*36*			*154*	
260533.10 Conduit									
Conduit to 15' H, incl couplings only, elec metallic tubing, 1/2" dia - power	30.00 lf	3.32 /lf	99	1.19 /lf	36	-	4.51 /lf	135	
Conduit			*99*		*36*			*135*	
265313.10 Exit Lighting									
Exit & emer ltg, exit light clg or wall mount, L.E.D. std. double face	2.00 ea	215.22 /ea	430	158.71 /ea	317	-	373.93 /ea	748	
Exit Lighting			*430*		*317*			*748*	
Electrical		*/ls*	*648*	*/ls*	*390*		*/ls*	*1,038*	
A056		*/ls*	*778*	*/ls*	*390*		*/ls*	*1,168*	
A057									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	3.60 hr	72.48 /hr	261	-	-	-	72.48 /hr	261	
			261					*261*	
General Requirements		*/ls*	*261*	*/ls*			*/ls*	*261*	
260000.00 Electrical									
260519.90 Wire									
Wire, 600 volt, type THW, copper, stranded, #12 - power	1.80 clf	131.09 /clf	236	40.47 /clf	73	-	171.56 /clf	309	

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
Wire			*236*		*73*			*309*	
260533.10 Conduit									
Conduit to 15' H, incl couplings only, elec metallic tubing, 1/2" dia - power	60.00 lf	3.32 /lf	199	1.20 /lf	72	-	4.51 /lf	271	
Conduit			*199*		*72*			*271*	
265313.10 Exit Lighting									
Exit & emer ltg, exit light clg or wall mount, L.E.D. std. double face	4.00 ea	215.22 /ea	861	158.70 /ea	635	-	373.92 /ea	1,496	
Exit Lighting			*861*		*635*			*1,496*	
Electrical		*/ls*	*1,296*	*/ls*	*779*		*/ls*	*2,075*	
A057		***/ls***	***1,557***	***/ls***	***779***		***/ls***	***2,336***	
A058									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	1.80 hr	72.49 /hr	130	-	-	-	72.49 /hr	130	
			130					*130*	
General Requirements		*/ls*	*130*	*/ls*			*/ls*	*130*	
260000.00 Electrical									
260519.90 Wire									
Wire, 600 volt, type THW, copper, stranded, #12 - power	0.90 clf	131.08 /clf	118	40.48 /clf	36	-	171.56 /clf	154	
Wire			*118*		*36*			*154*	
260533.10 Conduit									
Conduit to 15' H, incl couplings only, elec metallic tubing, 1/2" dia - power	30.00 lf	3.32 /lf	99	1.19 /lf	36	-	4.51 /lf	135	
Conduit			*99*		*36*			*135*	
265313.10 Exit Lighting									
Exit & emer ltg, exit light clg or wall mount, L.E.D. std. double face	2.00 ea	215.22 /ea	430	158.72 /ea	317	-	373.94 /ea	748	
Exit Lighting			*430*		*317*			*748*	
Electrical		*/ls*	*648*	*/ls*	*390*		*/ls*	*1,038*	
A058		***/ls***	***778***	***/ls***	***390***		***/ls***	***1,168***	
A059									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	0.90 hr	72.49 /hr	65	-	-	-	72.49 /hr	65	
			65					*65*	
General Requirements		*/ls*	*65*	*/ls*			*/ls*	*65*	
260000.00 Electrical									
260519.90 Wire									
Wire, 600 volt, type THW, copper, stranded, #12 - power	0.45 clf	131.11 /clf	59	40.49 /clf	18	-	171.60 /clf	77	
Wire			*59*		*18*			*77*	
260533.10 Conduit									

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
260533.10 Conduit									
Conduit to 15' H, incl couplings only, elec metallic tubing, 1/2" dia - power	15.00 lf	3.31 /lf	50	1.20 /lf	18	-	4.51 /lf	68	
Conduit			*50*		*18*			*68*	
265313.10 Exit Lighting									
Exit & emer ltg, exit light clg or wall mount, L.E.D. std. double face	1.00 ea	215.22 /ea	215	158.74 /ea	159	-	373.96 /ea	374	
Exit Lighting			*215*		*159*			*374*	
Electrical		*/ls*	*324*	*/ls*	*195*		*/ls*	*519*	
A059		*/ls*	*389*	*/ls*	*195*		*/ls*	*584*	
A060									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	1.07 hr	72.46 /hr	78	-	-	-	72.46 /hr	78	
			78					*78*	
General Requirements		*/ls*	*78*	*/ls*			*/ls*	*78*	
260000.00 Electrical									
260519.90 Wire									
Wire, 600 volt, type THW, copper, stranded, #12 - power	0.45 clf	131.11 /clf	59	40.47 /clf	18	-	171.58 /clf	77	
Wire			*59*		*18*			*77*	
260533.10 Conduit									
Conduit to 15' H, incl couplings only, elec metallic tubing, 1/2" dia - power	15.00 lf	3.31 /lf	50	1.19 /lf	18	-	4.51 /lf	68	
Conduit			*50*		*18*			*68*	
265313.10 Exit Lighting									
Exit & emer ltg, exit light clg or wall mount, L.E.D. std. double face	1.00 ea	215.22 /ea	215	158.74 /ea	159	-	373.96 /ea	374	
Exit Lighting			*215*		*159*			*374*	
Electrical		*/ls*	*324*	*/ls*	*195*		*/ls*	*519*	
26-05-05.00 Selective Demolition For Electrical									
26-05-05.50 Electrical Demolition, Lighting									
Exit light, electrical demolition, remove	1.00 ea	57.54 /ea	58	-	-	-	57.54 /ea	58	
Electrical Demolition, Lighting			*58*					*58*	
Selective Demolition For Electrical			*58*					*58*	
A060		*/ls*	*459*	*/ls*	*195*		*/ls*	*654*	
A061									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	2.17 hr	72.48 /hr	157	-	-	-	72.48 /hr	157	
			157					*157*	
General Requirements		*/ls*	*157*	*/ls*			*/ls*	*157*	
080000.00 Openings									
080505.10 Selective Demolition									

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
080505.10 Selective Demolition									
Remove Door Hardware	1.00 ea	169.66 /ea	170	-	-	-	169.66 /ea	170	
Selective Demolition			*170*					*170*	
087120.15 Hardware									
Average, door hardware set, Single Exterior, with Panic Device	1.00 door	476.26 /door	476	1,434.80 /door	1,435	-	1,911.06 /door	1,911	
Hardware			*476*		*1,435*			*1,911*	
Openings		*/ls*	*646*	*/ls*	*1,435*		*/ls*	*2,081*	
A061		***/ls***	***803***	***/ls***	***1,435***		***/ls***	***2,238***	
A062									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	4.27 hr	72.48 /hr	309	-	-	-	72.48 /hr	309	
			309					*309*	
General Requirements		*/ls*	*309*	*/ls*			*/ls*	*309*	
080000.00 Openings									
080505.10 Selective Demolition									
Remove Door Hardware	1.00 ea	169.65 /ea	170	-	-	-	169.65 /ea	170	
Selective Demolition			*170*					*170*	
087120.15 Hardware									
Average, door hardware set, Double, UL Listed	1.00 pr	509.60 /pr	510	1,811.39 /pr	1,811	-	2,320.99 /pr	2,321	
Hardware			*510*		*1,811*			*2,321*	
087120.31 Door Closers									
Door closer, DEMO	2.00 ea	79.36 /ea	159			-	79.36 /ea	159	
Door Closer, surface mounted, heavy duty, fusible link arm	2.00 ea	238.14 /ea	476	518.55 /ea	1,037	-	756.69 /ea	1,513	
Door Closers			*635*		*1,037*			*1,672*	
Openings		*/ls*	*1,314*	*/ls*	*2,848*		*/ls*	*4,163*	
A062		***/ls***	***1,624***	***/ls***	***2,848***		***/ls***	***4,472***	
A063									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	1.00 hr	72.47 /hr	72	-	-	-	72.47 /hr	72	
			72					*72*	
General Requirements		*/ls*	*72*	*/ls*			*/ls*	*72*	
080000.00 Openings									
081313.15 Metal Doors									
Re-Inspect Fire Door and frame, provide new Label	1.00 ea	317.51 /ea	318	9.84 /ea	10	-	327.35 /ea	327	
Metal Doors			*318*		*10*			*327*	
Openings		*/ls*	*318*	*/ls*	*10*		*/ls*	*327*	
A063		***/ls***	***390***	***/ls***	***10***		***/ls***	***400***	
A064									
010000.00 General Requirements									
013113.20									

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
013113.20									
Field personnel, misc labor, cleanup	1.43 hr	72.47 /hr	104	-	-	-	72.47 /hr	104	
			104					*104*	
General Requirements		*/ls*	*104*	*/ls*			*/ls*	*104*	
090000.00 Finishes									
099123.35 Doors & Windows									
Prepare, Prime and Paint Wood or Metal Doors and Frames	5.00 sf	9.44 /sf	47	0.32 /sf	2	-	9.76 /sf	49	
Doors & Windows			*47*		*2*			*49*	
Finishes		*/ls*	*47*	*/ls*	*2*		*/ls*	*49*	
08-13-13.00 Hollow Metal Doors									
08-81-30.10 Reduce Heat Transfer Glass									
Insulating Glass, 1-lite, B-label 1-1/2 hr fire-rated glass, 1/4" float, 1/2" thick, fire door lite kit (10" x 10") - DEMO	1.00 ea	106.76 /ea	107			-	106.76 /ea	107	
Insulating Glass, 1-lite, B-label 1-1/2 hr fire-rated glass, 1/4" float, 1/2" thick, fire door lite kit (10" x 10")	1.00 ea	160.09 /ea	160	139.99 /ea	140	-	300.08 /ea	300	
Reduce Heat Transfer Glass			*267*		*140*			*407*	
Hollow Metal Doors			*267*		*140*			*407*	
A064		*/ls*	***418***	*/ls*	***142***		*/ls*	***559***	
A065									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	3.00 hr	72.48 /hr	217	-	-	-	72.48 /hr	217	
			217					*217*	
General Requirements		*/ls*	*217*	*/ls*			*/ls*	*217*	
080000.00 Openings									
087120.40 Lockset									
Remove & Replace Door Knobs with Lever Handles w/Tactile warning - ADA	5.00 ea	190.50 /ea	953	253.18 /ea	1,266	-	443.68 /ea	2,218	
Lockset			*953*		*1,266*			*2,218*	
Openings		*/ls*	*953*	*/ls*	*1,266*		*/ls*	*2,218*	
A065		*/ls*	***1,170***	*/ls*	***1,266***		*/ls*	***2,436***	
A066									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	6.50 hr	72.48 /hr	471	-	-	-	72.48 /hr	471	
			471					*471*	
General Requirements		*/ls*	*471*	*/ls*			*/ls*	*471*	
080000.00 Openings									
087120.40 Lockset									

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
087120.40 Lockset									
Remove & Replace Door Knobs with Lever Handles - ADA	13.00 ea	158.75 /ea	2,064	208.85 /ea	2,715	-	367.60 /ea	4,779	
Lockset			*2,064*		*2,715*			*4,779*	
Openings		*/ls*	*2,064*	*/ls*	*2,715*		*/ls*	*4,779*	
A066		*/ls*	*2,535*	*/ls*	*2,715*		*/ls*	*5,250*	
A067									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	6.06 hr	72.48 /hr	439	-	-	-	72.48 /hr	439	
			439					*439*	
General Requirements		*/ls*	*439*	*/ls*			*/ls*	*439*	
080000.00 Openings									
080505.10 Selective Demolition									
Remove Door, Frame and Hardware	1.00 ea	237.47 /ea	237	11.28 /ea	11	-	248.75 /ea	249	
Selective Demolition			*237*		*11*			*249*	
081213.13 Standard Hollow Metal Frames									
Steel frs, knock dn, 16 ga., up to 5-3/4" D, 7'-0" hi, 3'-0" W, sgl	1.00 ea	238.13 /ea	238	334.55 /ea	335	-	572.68 /ea	573	
Standard Hollow Metal Frames			*238*		*335*			*573*	
081416.09 Flush Wood Doors									
Wood dr, arch, fl, int, 5 ply particle core, lauan face, 3'-0"x7'-0"	1.00 ea	195.39 /ea	195	223.05 /ea	223	-	418.44 /ea	418	
Flush Wood Doors			*195*		*223*			*418*	
087120.15 Hardware									
Auto-Lock, door latch hardware set, interior, U.L. Listed	1.00 door	476.22 /door	476	1,184.81 /door	1,185	-	1,661.03 /door	1,661	
Hardware			*476*		*1,185*			*1,661*	
087120.65 Thresholds									
Thresholds, aluminum, saddle-type,3'-0" long x 8" wide x 1/2" thick, ADA compliant	1.00 ea	158.77 /ea	159	105.50 /ea	106	-	264.27 /ea	264	
Thresholds			*159*		*106*			*264*	
087120.90 Hinges									
Hinges, full mortise, hi frequency, SS base, 4-1/2" x 4-1/2", us32	2.00 pr	-	-	269.76 /pr	540	-	269.76 /pr	540	
Hinges					*540*			*540*	
Openings		*/ls*	*1,306*	*/ls*	*2,399*		*/ls*	*3,705*	
090000.00 Finishes									
099123.35 Doors & Windows									
Prepare, Prime and Paint Wood or Metal Doors and Frames	50.00 sf	9.44 /sf	472	0.32 /sf	16	-	9.76 /sf	488	
Doors & Windows			*472*		*16*			*488*	
Finishes		*/ls*	*472*	*/ls*	*16*		*/ls*	*488*	
A067		*/ls*	*2,217*	*/ls*	*2,415*		*/ls*	*4,632*	
A069									

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	107.46 hr	72.48 /hr	7,789	-	-	-	72.48 /hr	7,789	
			7,789					*7,789*	
General Requirements		*/ls*	*7,789*	*/ls*			*/ls*	*7,789*	
090000.00 Finishes									
090505.20 Selective Demolition									
Flooring demo, prep existing floor for new finish	860.00 sf	13.79 /sf	11,857	-	-	4,369	18.87 /sf	16,225	
Flooring demo, Vinyl Floor Tiles	860.00 sf	10.59 /sf	9,108	-	-	-	10.59 /sf	9,108	D
Selective Demolition			*20,964*			*4,369*		*25,333*	
096519.10 Resilient Tile Flooring									
Resilient, vinyl composition tile, 1/8" thick, solid	860.00 sf	11.61 /sf	9,981	4.87 /sf	4,190	-	16.48 /sf	14,170	D
Resilient Tile Flooring			*9,981*		*4,190*			*14,170*	
Finishes		*/ls*	*30,945*	*/ls*	*4,190*	*4,369*	*/ls*	*39,503*	
A069		*/ls*	*38,733*	*/ls*	*4,190*	*4,369*	*/ls*	*47,292*	
A070									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	20.49 hr	72.48 /hr	1,485	-	-	-	72.48 /hr	1,485	
			1,485					*1,485*	
General Requirements		*/ls*	*1,485*	*/ls*			*/ls*	*1,485*	
020000.00 Existing Conditions									
028213.41 Asbestos Abatement Equipment									
Asbestos abat equip, HEPA vacuum for work area, minimum	1.00 ea	-	-	2,517.50 /ea	2,518	-	2,517.50 /ea	2,518	
Asbestos Abatement Equipment					*2,518*			*2,518*	
028213.42 Preparation Of Asbestos Containment Area									
Asbestos abat work area, pre-cleaning, HEPA vacuum & wet wipe	85.00 sf	0.95 /sf	81	0.02 /sf	2	-	0.97 /sf	83	
Asbestos abat work area, set up neg. air machine, 1-2k CFM	1.00 ea	331.58 /ea	332	-	-	-	331.58 /ea	332	
Preparation Of Asbestos Containment Area			*412*		*2*			*414*	
028213.44 Demolition In Asbestos Contaminated Area									
Remove Asbestos containing Floor Tiles	85.00 sf	17.84 /sf	1,517	0.61 /sf	52	269	21.62 /sf	1,838	
Demolition In Asbestos Contaminated Area			*1,517*		*52*	*269*		*1,838*	
028213.45 OSHA Testing									
Osha testing, certified technician, maximum	1.00 day	959.14 /day	959	-	-	-	959.14 /day	959	
Osha testing, industrial hygenist, minimum	1.00 day	767.27 /day	767	-	-	-	767.27 /day	767	
OSHA Testing			*1,726*					*1,726*	
Existing Conditions		*/ls*	*3,655*	*/ls*	*2,571*	*269*	*/ls*	*6,496*	
090000.00 Finishes									
090505.20 Selective Demolition									
Flooring demo, prep existing floor for new finish	85.00 sf	13.79 /sf	1,172	-	-	432	18.87 /sf	1,604	D

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
Selective Demolition			*1,172*			*432*		*1,604*	
096519.10 Resilient Tile Flooring									
Resilient, vinyl composition tile, 1/8" thick, solid	85.00 sf	11.61 /sf	986	4.87 /sf	414	-	16.48 /sf	1,401	D
Resilient Tile Flooring			*986*		*414*			*1,401*	
Finishes		*/ls*	*2,158*	*/ls*	*414*	*432*	*/ls*	*3,004*	
A070		***/ls***	***7,299***	***/ls***	***2,986***	***701***	***/ls***	***10,985***	
A071									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	3.00 hr	72.49 /hr	217	-	-	-	72.49 /hr	217	
			217					*217*	
General Requirements		*/ls*	*217*	*/ls*			*/ls*	*217*	
090000.00 Finishes									
090505.20 Selective Demolition									
Flooring demo, carpet, bonded, including surface scraping - Floors (small area)	50.00 sf	7.63 /sf	381	-	-	-	7.63 /sf	381	
Selective Demolition			*381*					*381*	
099123.40 Floors, Concrete									
Prime and Paint Flooring - Epoxy Paint - for high use areas	50.00 sf	8.03 /sf	401	3.78 /sf	189	3	11.87 /sf	593	
Floors, Concrete			*401*		*189*	*3*		*593*	
Finishes		*/ls*	*783*	*/ls*	*189*	*3*	*/ls*	*975*	
A071		***/ls***	***1,000***	***/ls***	***189***	***3***	***/ls***	***1,192***	
A072									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	180.18 hr	72.48 /hr	13,059	-	-	-	72.48 /hr	13,059	
			13,059					*13,059*	
General Requirements		*/ls*	*13,059*	*/ls*			*/ls*	*13,059*	
020000.00 Existing Conditions									
028213.41 Asbestos Abatement Equipment									
Asbestos abat equip, HEPA vacuum for work area, minimum	1.00 ea	-	-	2,517.51 /ea	2,518	-	2,517.51 /ea	2,518	
Asbestos Abatement Equipment					*2,518*			*2,518*	
028213.42 Preparation Of Asbestos Containment Area									
Asbestos abat work area, pre-cleaning, HEPA vacuum & wet wipe	1,340.00 sf	0.95 /sf	1,274	0.02 /sf	31	-	0.97 /sf	1,305	
Asbestos abat work area, set up neg. air machine, 1-2k CFM	1.00 ea	331.56 /ea	332	-	-	-	331.56 /ea	332	
Preparation Of Asbestos Containment Area			*1,606*		*31*			*1,637*	
028213.44 Demolition In Asbestos Contaminated Area									
Remove Asbestos containing Floor Tiles	1,340.00 sf	17.84 /sf	23,909	0.61 /sf	820	4,241	21.62 /sf	28,970	
Demolition In Asbestos Contaminated Area			*23,909*		*820*	*4,241*		*28,970*	
028213.45 OSHA Testing									

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
028213.45 OSHA Testing									
Osha testing, certified technician, maximum	4.00 day	959.10 /day	3,836	-	-	-	959.10 /day	3,836	
Osha testing, industrial hygenist, minimum	4.00 day	767.29 /day	3,069	-	-	-	767.29 /day	3,069	
OSHA Testing			*6,906*					*6,906*	
Existing Conditions		*/ls*	*32,421*	*/ls*	*3,369*	*4,241*	*/ls*	*40,030*	
090000.00 Finishes									
096913.10 Access Floors									
Remove Access Floor, inc. support system	1,340.00 sf	4.76 /sf	6,382			-	4.76 /sf	6,382	D
Access floor, computer room, < 6,000 S.F.	1,340.00 sf	6.77 /sf	9,077	23.37 /sf	31,311	-	30.14 /sf	40,388	D
Install Laminate tile flooring on raised access floor	1,340.00 sf	2.14 /sf	2,862	13.05 /sf	17,488	-	15.19 /sf	20,349	D
Pedestal access floors, approach ramps, maximum	49.00 sf	63.50 /sf	3,111	80.79 /sf	3,959	-	144.29 /sf	7,070	D
Pedestal access floors, handrail, 2 rail, aluminum	28.00 lf	84.67 /lf	2,371	239.88 /lf	6,717	-	324.55 /lf	9,087	D
Access Floors			*23,803*		*59,474*			*83,276*	
Finishes		*/ls*	*23,803*	*/ls*	*59,474*		*/ls*	*83,276*	
A072		*/ls*	*69,283*	*/ls*	*62,842*	*4,241*	*/ls*	*136,366*	
A073									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	3.55 hr	72.48 /hr	257	-	-	-	72.48 /hr	257	
			257					*257*	
General Requirements		*/ls*	*257*	*/ls*			*/ls*	*257*	
090000.00 Finishes									
096913.10 Access Floors									
Remove Access Floor, inc. support system	80.00 sf	4.76 /sf	381			-	4.76 /sf	381	D
Access floor, computer room, < 6,000 S.F.	80.00 sf	6.77 /sf	542	23.37 /sf	1,869	-	30.14 /sf	2,411	D
Install Laminate tile flooring on raised access floor	80.00 sf	2.14 /sf	171	13.05 /sf	1,044	-	15.19 /sf	1,215	D
Access Floors			*1,094*		*2,913*			*4,007*	
Finishes		*/ls*	*1,094*	*/ls*	*2,913*		*/ls*	*4,007*	
A073		*/ls*	*1,351*	*/ls*	*2,913*		*/ls*	*4,264*	
A074									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	4.20 hr	72.48 /hr	304	-	-	-	72.48 /hr	304	
			304					*304*	
General Requirements		*/ls*	*304*	*/ls*			*/ls*	*304*	
090000.00 Finishes									
095123.10 Suspended Acoustic Ceiling Tiles									
Remove & Replace Accoustical Ceiling Tiles - 2' x 2'	280.00 sf	4.76 /sf	1,334	2.51 /sf	703	-	7.27 /sf	2,037	D
Suspended Acoustic Ceiling Tiles			*1,334*		*703*			*2,037*	
Finishes		*/ls*	*1,334*	*/ls*	*703*		*/ls*	*2,037*	
A074		*/ls*	*1,638*	*/ls*	*703*		*/ls*	*2,341*	
A075									
010000.00 General Requirements									

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
013113.20									
Field personnel, misc labor, cleanup	3.60 hr	72.47 /hr	261	-	-	-	72.47 /hr	261	
			261					*261*	
General Requirements		*/ls*	*261*	*/ls*			*/ls*	*261*	
090000.00 Finishes									
095123.10 Suspended Acoustic Ceiling Tiles									
Remove & Replace Accoustical Ceiling Tiles - 2' x 2'	240.00 sf	4.76 /sf	1,143	2.51 /sf	603	-	7.27 /sf	1,746	D
Suspended Acoustic Ceiling Tiles			*1,143*		*603*			*1,746*	
Finishes		*/ls*	*1,143*	*/ls*	*603*		*/ls*	*1,746*	
A075		***/ls***	***1,404***	***/ls***	***603***		***/ls***	***2,007***	
A076									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	111.80 hr	72.48 /hr	8,103	-	-	-	72.48 /hr	8,103	
			8,103					*8,103*	
General Requirements		*/ls*	*8,103*	*/ls*			*/ls*	*8,103*	
090000.00 Finishes									
098413.10 Fixed Panels									
Acoustic Wall Panels - Remove	1,600.00 sf	4.34 /sf	6,942			-	4.34 /sf	6,942	D
Acoustic Wall Panels	1,600.00 sf	17.85 /sf	28,555	28.27 /sf	45,238	-	46.12 /sf	73,793	D
Fixed Panels			*35,497*		*45,238*			*80,735*	
Finishes		*/ls*	*35,497*	*/ls*	*45,238*		*/ls*	*80,735*	
A076		***/ls***	***43,600***	***/ls***	***45,238***		***/ls***	***88,838***	
A077									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	6.01 hr	72.48 /hr	435	-	-	-	72.48 /hr	435	
			435					*435*	
General Requirements		*/ls*	*435*	*/ls*			*/ls*	*435*	
050000.00 Metals									
055213.50 Railings, Pipe									
Railing, wall rail, alum. pipe, 1-1/2" diameter, satin finish	40.00 lf	28.12 /lf	1,125	39.97 /lf	1,599	63	69.66 /lf	2,786	
Handrail Wall Bracket, steel, for 1-1/2" diameter handrail, includes attachment to Metal Stud wall	12.00 ea	93.58 /ea	1,123	42.83 /ea	514		136.41 /ea	1,637	
Railings, Pipe			*2,248*		*2,113*	*63*		*4,423*	
Metals		*/ls*	*2,248*	*/ls*	*2,113*	*63*	*/ls*	*4,423*	
A077		***/ls***	***2,683***	***/ls***	***2,113***	***63***	***/ls***	***4,858***	
A078									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	24.78 hr	72.48 /hr	1,796	-	-	-	72.48 /hr	1,796	

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
			1,796					*1,796*	
General Requirements		***/ls***	***1,796***	***/ls***			***/ls***	***1,796***	
100000.00 Specialties									
102813.13 Commercial Toilet Accessories									
Remove Paper Towel Dispenser	2.00 ea	119.06 /ea	238			-	119.06 /ea	238	
Bathroom accessories, grab bar, straight, 1-1/2" dia, SS, 24" long	2.00 ea	95.25 /ea	190	88.55 /ea	177	-	183.80 /ea	368	
Bathroom accessories, grab bar, straight, 1-1/2" dia, SS, 36" long	2.00 ea	105.89 /ea	212	108.17 /ea	216	-	214.06 /ea	428	
Bathroom accessories, towel dispenser, sst, surf mounted, ADA	2.00 ea	79.37 /ea	159	96.95 /ea	194	-	176.31 /ea	353	
Commercial Toilet Accessories			***799***		***587***			***1,386***	
Specialties		***/ls***	***799***	***/ls***	***587***		***/ls***	***1,386***	
220000.00 Plumbing									
220505.10 Plumbing Labor									
Plumbing Labor, Plumber, Foreman, reuse piping and connections	4.00 hr	194.92 /hr	780	26.38 /hr	106	-	221.29 /hr	885	
Plumbing dml, RELOCATION OF DWV & WATER SERVICES	4.00 hr	194.92 /hr	780	105.50 /hr	422	-	300.42 /hr	1,202	
Plumbing dml, fixtures w/10' pipe, water closet, floor mounted	2.00 ea	194.91 /ea	390	-	-	-	194.91 /ea	390	
Plumbing dml, fixtures w/10' pipe, urinal, floor mounted	1.00 ea	389.81 /ea	390	-	-	-	389.81 /ea	390	
Plumbing Labor			***2,339***		***528***			***2,866***	
220719.10 Piping Insulation									
Insulated protector, piping under sink/lav, P trap, 1-1/4 or 1-1/2"	5.00 ea	20.90 /ea	105	49.83 /ea	249	-	70.73 /ea	354	
Insulated protector,piping under sink/lav,valva/supply 1/2 thru 7/16"	5.00 ea	20.91 /ea	105	49.82 /ea	249	-	70.74 /ea	354	
Insulated protector, piping under sink/lav, drain cover, 1-1/4 1-1/2"	5.00 ea	20.91 /ea	105	52.20 /ea	261	-	73.11 /ea	366	
Insulated protector, piping under sink/lav, tailpiece offset, 1-1/4"	5.00 ea	20.90 /ea	105	58.14 /ea	291	-	79.04 /ea	395	
Piping Insulation			***418***		***1,050***			***1,468***	
224113.40 Water Closets									
Water clo, tank, vit china, seat, supply w/stop, w/18"H bowl - ADA	2.00 ea	529.57 /ea	1,059	1,139.59 /ea	2,279	-	1,669.16 /ea	3,338	
Water clos,tk type,vit china,incl seat,flr mtd,for rgh-in,sply,W	2.00 ea	920.25 /ea	1,841	557.07 /ea	1,114	-	1,477.32 /ea	2,955	
Water Closets			***2,900***		***3,393***			***6,293***	
224213.30 Urinals									
Urinals, wall hung, vitreous china, hanger & self-closing valve,siphon, ADA	1.00 ea	935.62 /ea	936	830.52 /ea	831	-	1,766.14 /ea	1,766	

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
224213.30 Urinals									
Urinals, wall hung, vitreous china, rough-in, supply, waste & vent	1.00 ea	991.79 /ea	992	449.75 /ea	450	-	1,441.54 /ea	1,442	
Urinals			*1,927*		*1,280*			*3,208*	
Plumbing		*/ls*	*7,584*	*/ls*	*6,251*		*/ls*	*13,835*	
A078		*/ls*	*10,179*	*/ls*	*6,838*		*/ls*	*17,018*	
A079									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	32.02 hr	72.48 /hr	2,321	-	-	-	72.48 /hr	2,321	
			2,321					*2,321*	
General Requirements		*/ls*	*2,321*	*/ls*			*/ls*	*2,321*	
260000.00 Electrical									
260505.25 Electrical Demolition, Electrical Power									
Electrical demolition	18.50 hr	180.25 /hr	3,335	-	-	-	180.25 /hr	3,335	D
Electrical Demolition, Electrical Power			*3,335*					*3,335*	
Electrical		*/ls*	*3,335*	*/ls*			*/ls*	*3,335*	
26-09-23.00 Lighting Control Devices									
26-09-23.10 Energy Saving Lighting Devices									
Lighting devices, occupancy sensors	37.00 ea	79.42 /ea	2,939	308.77 /ea	11,424	-	388.19 /ea	14,363	D
Energy Saving Lighting Devices			*2,939*		*11,424*			*14,363*	
Lighting Control Devices			*2,939*		*11,424*			*14,363*	
A079		*/ls*	*8,594*	*/ls*	*11,424*		*/ls*	*20,018*	
A080									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	106.43 hr	72.48 /hr	7,714	-	-	-	72.48 /hr	7,714	
			7,714					*7,714*	
General Requirements		*/ls*	*7,714*	*/ls*			*/ls*	*7,714*	
060000.00 Wood, Plastics, and Composites									
060505.20 Demolition									
Remove Countertop and base cabinets	34.00 lf	203.42 /lf	6,916	-	-	-	203.42 /lf	6,916	D
Remove Wall cabinets	34.00 lf	50.85 /lf	1,729	-	-	-	50.85 /lf	1,729	D
Demolition			*8,645*					*8,645*	
Wood, Plastics, and Composites		*/****	*8,645*	*/****			*/****	*8,645*	
090000.00 Finishes									
099123.72 Walls And Ceilings									
Prepare, Prime and Paint GWB Walls	300.00 sf	5.02 /sf	1,504	0.72 /sf	215	-	5.73 /sf	1,720	
Walls And Ceilings			*1,504*		*215*			*1,720*	
Finishes		*/ls*	*1,504*	*/ls*	*215*		*/ls*	*1,720*	
110000.00 Equipment									
114813.10 Appliances									
Garbage Disposal Sink type	1.00 ea	375.16 /ea	375	236.32 /ea	236	-	611.48 /ea	611	D

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
Appliances			*375*		*236*			*611*	
Equipment		*/ls*	*375*	*/ls*	*236*		*/ls*	*611*	
120000.00 Furnishings									
123213.10 Cabinets / Counters / Shelves									
Kitchen Base Cabinets	34.00 lf	136.07 /lf	4,626	284.85 /lf	9,685	-	420.92 /lf	14,311	D
Kitchen Wall Cabinets	34.00 lf	144.00 /lf	4,896	242.65 /lf	8,250	-	386.65 /lf	13,146	D
Cabinets / Counters / Shelves			*9,522*		*17,935*			*27,457*	
123661.16 Plastic Laminate Accessories									
SSC, acryl polymer, Corian Pipe Screen, sol clr, inc. mounting brackets	1.00 ea	158.78 /ea	159	400.13 /ea	400	-	558.91 /ea	559	
Plastic Laminate Accessories			*159*		*400*			*559*	
Furnishings		*/ls*	*9,681*	*/ls*	*18,335*		*/ls*	*28,016*	
220000.00 Plumbing									
220505.10 Plumbing Labor									
Plumbing Labor, Plumber, Foreman, reuse piping and connections	4.00 hr	194.92 /hr	780	26.38 /hr	106	-	221.30 /hr	885	
Plumbing dml, RELOCATION OF DWV & WATER SERVICES	4.00 hr	194.92 /hr	780	105.50 /hr	422	-	300.42 /hr	1,202	
Plumbing dml, fixture, garbage disposal	1.00 hr	194.91 /hr	195	-	-	-	194.91 /hr	195	D
Plumbing demo, sink, single compartment, piping	1.00 ea	194.94 /ea	195	-	-	-	194.94 /ea	195	
Plumbing demo, faucet	1.00 ea	194.93 /ea	195	-	-	-	194.93 /ea	195	
Plumbing Labor			*2,144*		*528*			*2,672*	
224116.30 Sinks									
Sinks, W/ faucets & dr, kitchen, SS, self rimming, 25" x 22" sgl bowl, ADA compliant	1.00 ea	501.20 /ea	501	1,086.06 /ea	1,086	-	1,587.26 /ea	1,587	
Sinks			*501*		*1,086*			*1,587*	
Plumbing		*/ls*	*2,645*	*/ls*	*1,614*		*/ls*	*4,259*	
12-00-00.00 FURNISHINGS									
12-36-61.16 Solid Surface Countertops									
Solid Surface Countertops (Corian, acrylic polymer, patterned colors, with hard seam attached 4" backsplash, pricing for orders of 1 - 50 LF, 25" wide	34.00 lf	195.58 /lf	6,650	214.14 /lf	7,281	-	409.72 /lf	13,930	
Solid Surface Countertops			*6,650*		*7,281*			*13,930*	
FURNISHINGS			*6,650*		*7,281*			*13,930*	
23-00-00.00 HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)									
23-34-16.10 Centrifugal Type HVAC Fan Motor									
Fans, kitchen exhaust, REMOVE AND REINSTALL	1.00 ea	3,512.52 /ea	3,513	0.00 /ea	0	-	3,512.52 /ea	3,513	
Centrifugal Type HVAC Fan Motor			*3,513*					*3,513*	
HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)		*/ls*	*3,513*	*/ls*			*/ls*	*3,513*	
A080		*/ls*	***40,728***	*/ls*	***27,681***		*/ls*	***68,408***	
A081									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	34.46 hr	72.48 /hr	2,498	-	-	-	72.48 /hr	2,498	

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
			2,498					*2,498*	
General Requirements		***/ls***	***2,498***	***/ls***			***/ls***	***2,498***	
060000.00 Wood, Plastics, and Composites									
060505.20 Demolition									
Remove Countertop and base cabinets	10.00 lf	203.42 /lf	2,034	-	-	-	203.42 /lf	2,034	D
Remove Wall cabinets	10.00 lf	50.85 /lf	509	-	-	-	50.85 /lf	509	D
Demolition			*2,543*					*2,543*	
Wood, Plastics, and Composites		***/****	***2,543***	***/****			***/****	***2,543***	
090000.00 Finishes									
099123.72 Walls And Ceilings									
Prepare, Prime and Paint GWB Walls	100.00 sf	5.02 /sf	502	0.72 /sf	72	-	5.73 /sf	573	
Walls And Ceilings			*502*		*72*			*573*	
Finishes		***/ls***	***502***	***/ls***	***72***		***/ls***	***573***	
110000.00 Equipment									
114813.10 Appliances									
Garbage Disposal Sink type	1.00 ea	375.17 /ea	375	236.32 /ea	236	-	611.49 /ea	611	D
Appliances			*375*		*236*			*611*	
Equipment		***/ls***	***375***	***/ls***	***236***		***/ls***	***611***	
120000.00 Furnishings									
123213.10 Cabinets / Counters / Shelves									
Kitchen Base Cabinets	10.00 lf	136.06 /lf	1,361	284.85 /lf	2,849	-	420.91 /lf	4,209	D
Kitchen Wall Cabinets	10.00 lf	144.00 /lf	1,440	242.65 /lf	2,427	-	386.65 /lf	3,867	D
Cabinets / Counters / Shelves			*2,801*		*5,275*			*8,076*	
123661.16 Plastic Laminate Accessories									
SSC, acryl polymer, Corian Pipe Screen, sol clr, inc. mounting brackets	1.00 ea	158.76 /ea	159	400.17 /ea	400	-	558.93 /ea	559	
Plastic Laminate Accessories			*159*		*400*			*559*	
Furnishings		***/ls***	***2,959***	***/ls***	***5,675***		***/ls***	***8,635***	
220000.00 Plumbing									
220505.10 Plumbing Labor									
Plumbing Labor, Plumber, Foreman, reuse piping and connections	4.00 hr	194.91 /hr	780	26.38 /hr	106	-	221.29 /hr	885	
Plumbing dml, RELOCATION OF DWV & WATER SERVICES	4.00 hr	194.92 /hr	780	105.50 /hr	422	-	300.42 /hr	1,202	
Plumbing dml, fixture, garbage disposal	1.00 hr	194.92 /hr	195	-	-	-	194.92 /hr	195	D
Plumbing demo, sink, single compartment, piping	1.00 ea	194.93 /ea	195	-	-	-	194.93 /ea	195	
Plumbing demo, faucet	1.00 ea	194.92 /ea	195	-	-	-	194.92 /ea	195	
Plumbing Labor			*2,144*		*528*			*2,672*	
224116.30 Sinks									
Sinks, W/ faucets & dr, kitchen, SS, self rimming, 25" x 22" sgl bowl, ADA compliant	1.00 ea	501.19 /ea	501	1,086.08 /ea	1,086	-	1,587.27 /ea	1,587	
Sinks			*501*		*1,086*			*1,587*	
Plumbing		***/ls***	***2,645***	***/ls***	***1,614***		***/ls***	***4,259***	
12-00-00.00 FURNISHINGS									
12-36-61.16 Solid Surface Countertops									

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
12-36-61.16 Solid Surface Countertops									
Solid Surface Countertops (Corian, acrylic polymer, patterned colors, with hard seam attached 4" backsplash, pricing for orders of 1 - 50 LF, 25" wide	10.00 lf	195.58 /lf	1,956	214.14 /lf	2,141	-	409.72 /lf	4,097	
Solid Surface Countertops			*1,956*		*2,141*			*4,097*	
FURNISHINGS			*1,956*		*2,141*			*4,097*	
A081		*/ls*	*13,478*	*/ls*	*9,738*		*/ls*	*23,216*	
A082									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	7.63 hr	72.48 /hr	553	-	-	-	72.48 /hr	553	
			553					*553*	
General Requirements		*/ls*	*553*	*/ls*			*/ls*	*553*	
100000.00 Specialties									
101423.13 Specialities									
Install Room Signage - ADA Compliant	37.00 ea	31.79 /ea	1,176	54.86 /ea	2,030	-	86.65 /ea	3,206	
Remove Room Signs, includes touch-up painting of walls	30.00 ea	25.43 /ea	763	2.11 /ea	63	-	27.54 /ea	826	
Specialities			*1,939*		*2,093*			*4,032*	
Specialties		*/ls*	*1,939*	*/ls*	*2,093*		*/ls*	*4,032*	
A082		*/ls*	*2,492*	*/ls*	*2,093*		*/ls*	*4,585*	
A083									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	4.22 hr	72.48 /hr	306	-	-	-	72.48 /hr	306	
			306					*306*	
General Requirements		*/ls*	*306*	*/ls*			*/ls*	*306*	
090000.00 Finishes									
099123.35 Doors & Windows									
Prepare, Prime and Paint Wood or Metal Doors and Frames	70.00 sf	9.44 /sf	661	0.32 /sf	22	-	9.76 /sf	683	
Doors & Windows			*661*		*22*			*683*	
099713.23 Misc Repairs & Cleaning									
Remove Rust/Peeling/Cracking Paint and Prepare for New Paint	70.00 sf	6.42 /sf	450	0.32 /sf	22	-	6.74 /sf	472	
Misc Repairs & Cleaning			*450*		*22*			*472*	
Finishes		*/ls*	*1,111*	*/ls*	*44*		*/ls*	*1,155*	
A083		*/ls*	*1,417*	*/ls*	*44*		*/ls*	*1,461*	
A084									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	6.03 hr	72.48 /hr	437	-	-	-	72.48 /hr	437	
			437					*437*	

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
General Requirements		/ls	437	/ls			/ls	437	
090000.00 Finishes									
099123.35 Doors & Windows									
Prepare, Prime and Paint Wood or Metal Doors and Frames	100.00 sf	9.44 /sf	944	0.32 /sf	32	-	9.76 /sf	976	
Doors & Windows			944		32			976	
099713.23 Misc Repairs & Cleaning									
Remove Rust/Peeling/Cracking Paint and Prepare for New Paint	100.00 sf	6.43 /sf	642	0.32 /sf	32	-	6.74 /sf	674	
Misc Repairs & Cleaning			642		32			674	
Finishes		/ls	1,587	/ls	63		/ls	1,650	
A084		/ls	2,024	/ls	63		/ls	2,087	
A085									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	10.09 hr	72.48 /hr	731	-	-	-	72.48 /hr	731	
			731					731	
General Requirements		/ls	731	/ls			/ls	731	
070000.00 Thermal and Moisture Protection									
079210.10 Caulking And Sealants									
Caulking & sealants, joint around door frames, int & ext	40.00 lf	25.82 /lf	1,033	1.88 /lf	75	-	27.70 /lf	1,108	
Caulking And Sealants			1,033		75			1,108	
Thermal and Moisture Protection		/ls	1,033	/ls	75		/ls	1,108	
080000.00 Openings									
080505.10 Selective Demolition									
Remove Door, Frame and Hardware	1.00 ea	237.52 /ea	238	11.26 /ea	11	-	248.78 /ea	249	D
Selective Demolition			238		11			249	
081213.13 Standard Hollow Metal Frames									
Steel frs, knock dn, 14 ga., to 5-3/4" jamb d, 8'-0" hi, 3'-8" w, sgl	1.00 ea	169.32 /ea	169	267.84 /ea	268	-	437.16 /ea	437	D
Standard Hollow Metal Frames			169		268			437	
087120.15 Hardware									
Auto-Lock, door latch hardware set, interior, U.L. Listed	1.00 door	476.24 /door	476	1,184.79 /door	1,185	-	1,661.03 /door	1,661	
Hardware			476		1,185			1,661	
087120.31 Door Closers									
Door Closer, surface mounted, heavy duty, fusible link arm, U.L. Listed	1.00 ea	238.14 /ea	238	518.54 /ea	519	-	756.68 /ea	757	
Door Closers			238		519			757	
087120.90 Hinges									
Hinges, full mortise, hi frequency, SS base, 4-1/2" x 4-1/2", us32	2.00 pr	-	-	269.77 /pr	540	-	269.77 /pr	540	D
Hinges					540			540	

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
Openings		/ls	*1,121*	/ls	*2,522*		/ls	*3,643*	
090000.00 Finishes									
099123.35 Doors & Windows									
Prepare, Prime and Paint Wood or Metal Doors and Frames	70.00 sf	9.44 /sf	661	0.32 /sf	22	-	9.76 /sf	683	
Doors & Windows			*661*		*22*			*683*	
Finishes		/ls	*661*	/ls	*22*		/ls	*683*	
08-00-00.00 OPENINGS									
08-12-13.13 Standard Hollow Metal Frames									
Steel frames, add for galvanizing	1.00 ea	-	-	63.61 /ea	64	-	63.61 /ea	64	
Standard Hollow Metal Frames					*64*			*64*	
OPENINGS		/ls		/ls	*64*		/ls	*64*	
08-13-13.00 Hollow Metal Doors									
08-13-13.13 Standard Hollow Metal Doors									
Doors, commercial, steel, insulated, half glass, 18 ga., 3'-8" x 8'-0" x 1-3/4" thick	1.00 ea	100.34 /ea	100	1,358.25 /ea	1,358	-	1,458.59 /ea	1,459	D
Standard Hollow Metal Doors			*100*		*1,358*			*1,459*	
Hollow Metal Doors			*100*		*1,358*			*1,459*	
A085		/ls	*3,647*	/ls	*4,041*		/ls	*7,688*	
A086									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	1.00 hr	72.45 /hr	72	-	-	-	72.45 /hr	72	
			72					*72*	
General Requirements		/ls	*72*	/ls			/ls	*72*	
080000.00 Openings									
087120.31 Door Closers									
Door closer, DEMO	1.00 ea	79.39 /ea	79			-	79.39 /ea	79	
Door Closer, surface mounted, heavy duty, fusible link arm, U.L. Listed	1.00 ea	238.14 /ea	238	518.54 /ea	519	-	756.68 /ea	757	
Door Closers			*318*		*519*			*836*	
Openings		/ls	*318*	/ls	*519*		/ls	*836*	
A086		/ls	*390*	/ls	*519*		/ls	*909*	
A087									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	65.29 hr	72.48 /hr	4,732	-	-	-	72.48 /hr	4,732	
			4,732					*4,732*	
General Requirements		/ls	*4,732*	/ls			/ls	*4,732*	
070000.00 Thermal and Moisture Protection									
079210.10 Caulking And Sealants									
Caulking & sealants, joint around curtainwall, int & ext	140.00 lf	25.82 /lf	3,615	1.88 /lf	263	-	27.70 /lf	3,878	

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
Caulking And Sealants			*3,615*		*263*			*3,878*	
Thermal and Moisture Protection		*/ls*	*3,615*	*/ls*	*263*		*/ls*	*3,878*	
080000.00 Openings									
080505.10 Selective Demolition									
Remove Door, Frame and Hardware	2.00 ea	237.50 /ea	475	11.27 /ea	23	-	248.76 /ea	498	
Selective Demolition			*475*		*23*			*498*	
084313.20 Storefront Systems									
Remove and replace existing Glazed Store Front, 1" thick insulated glass, tempered, tinted	200.00 sf	60.40 /sf	12,079	115.63 /sf	23,126	-	176.03 /sf	35,205	D
Door in glazed storefront system, single, add	2.00 ea	452.97 /ea	906	1,683.78 /ea	3,368	-	2,136.75 /ea	4,274	
Storefront Systems			*12,985*		*26,493*			*39,478*	
087120.15 Hardware									
Average, door hardware set, Single Exterior, with Panic Device, UL Rated	2.00 door	476.27 /door	953	1,434.80 /door	2,870	-	1,911.07 /door	3,822	
Hardware			*953*		*2,870*			*3,822*	
087120.31 Door Closers									
Door Closer, surface mounted, heavy duty, fusible link arm	2.00 ea	238.12 /ea	476	518.55 /ea	1,037	-	756.67 /ea	1,513	
Door Closers			*476*		*1,037*			*1,513*	
087120.65 Thresholds									
Thresholds, aluminum, saddle-type,3'-6" long x 8" wide x 1/2" thick, ADA compliant	2.00 ea	158.76 /ea	318	139.26 /ea	279	-	298.02 /ea	596	
Thresholds			*318*		*279*			*596*	
087120.90 Hinges									
Hinges, full mortise, hi frequency, SS base, 4-1/2" x 4-1/2", us32	3.00 pr	-	-	269.77 /pr	809	-	269.77 /pr	809	
Hinges					*809*			*809*	
Openings		*/ls*	*15,207*	*/ls*	*31,510*		*/ls*	*46,717*	
260000.00 Electrical									
260590.10 Residential Wiring									
Electrician, labor, disconnect & reconnect latch to security system & security card reader	2.00 ea	721.00 /ea	1,442	47.48 /ea	95	-	768.47 /ea	1,537	
Residential Wiring			*1,442*		*95*			*1,537*	
Electrical		*/ls*	*1,442*	*/ls*	*95*		*/ls*	*1,537*	
A087		*/ls*	*24,996*	*/ls*	*31,868*		*/ls*	*56,863*	
A088									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	7.82 hr	72.48 /hr	567	-	-	-	72.48 /hr	567	
			567					*567*	
General Requirements		*/ls*	*567*	*/ls*			*/ls*	*567*	
070000.00 Thermal and Moisture Protection									
079210.10 Caulking And Sealants									
Remove & Replace damaged Sealants	175.00 lf	11.15 /lf	1,952	2.53 /lf	443	502	16.55 /lf	2,897	

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
079210.10 Caulking And Sealants									
Caulking and sealants, backer rod, polyethylene, 1/2" diameter	1.75 clf	269.38 /clf	471	15.37 /clf	27	-	284.74 /clf	498	
Caulking And Sealants			*2,423*		*470*	*502*		*3,395*	
Thermal and Moisture Protection		*/ls*	*2,423*	*/ls*	*470*	*502*	*/ls*	*3,395*	
A088		*/ls*	*2,990*	*/ls*	*470*	*502*	*/ls*	*3,962*	
A089									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	7.20 hr	72.48 /hr	522	-	-	-	72.48 /hr	522	
			522					*522*	
General Requirements		*/ls*	*522*	*/ls*			*/ls*	*522*	
070000.00 Thermal and Moisture Protection									
079210.10 Caulking And Sealants									
Remove & Replace damaged Sealants	200.00 lf	11.15 /lf	2,231	2.53 /lf	506	574	16.55 /lf	3,311	
Caulking And Sealants			*2,231*		*506*	*574*		*3,311*	
Thermal and Moisture Protection		*/ls*	*2,231*	*/ls*	*506*	*574*	*/ls*	*3,311*	
A089		*/ls*	*2,752*	*/ls*	*506*	*574*	*/ls*	*3,833*	
A090									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	39.58 hr	72.48 /hr	2,869	-	-	-	72.48 /hr	2,869	
			2,869					*2,869*	
General Requirements		*/ls*	*2,869*	*/ls*			*/ls*	*2,869*	
030000.00 Concrete									
030505.10 Selective Concrete Demolition									
Selective concrete demolitn,break into small pieces,average reinforcng - small quantity	1.00 cy	513.98 /cy	514	-	-	53	566.67 /cy	567	
Selective Concrete Demolition			*514*			*53*		*567*	
033053.40 Concrete									
Concrete in place, foundation wall, reinforced - Form and Repair existing	1.00 cy	2,435.08 /cy	2,435	328.41 /cy	328	1	2,764.79 /cy	2,765	
Concrete			*2,435*		*328*	*1*		*2,765*	
Concrete		*/ls*	*2,949*	*/ls*	*328*	*54*	*/ls*	*3,331*	
040000.00 Masonry									
040120.50 Toothing Masonry									
Toothing, blockwork, hard mortar	20.00 vlf	29.76 /vlf	595	-	-	-	29.76 /vlf	595	D
Toothing Masonry			*595*					*595*	
040505.10 Selective Demolition									
Masonry demolition, veneers, brick, hard mortar	160.00 sf	8.14 /sf	1,302	-	-	-	8.14 /sf	1,302	D
Selective Demolition			*1,302*					*1,302*	
042113.13 Brick Veneer Masonry									
Altn mthd by SF,4"x2-2/3"x8",eng,full hdr every 2nd course(10.13/S.F.)	160.00 sf	41.15 /sf	6,584	13.85 /sf	2,216	-	55.00 /sf	8,800	D

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
Brick Veneer Masonry			*6,584*		*2,216*			*8,800*	
Masonry		*/*****	*8,481*	*/*****	*2,216*		*/*****	*10,697*	
A090		*/ls*	*14,299*	*/ls*	*2,545*	*54*	*/ls*	*16,897*	
A091									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	4.99 hr	72.48 /hr	362	-	-	-	72.48 /hr	362	
			362					*362*	
General Requirements		*/ls*	*362*	*/ls*			*/ls*	*362*	
070000.00 Thermal and Moisture Protection									
079210.10 Caulking And Sealants									
Caulking & sealants, joint around window frames, int & ext	40.00 lf	25.82 /lf	1,033	1.88 /lf	75	-	27.70 /lf	1,108	
Caulking And Sealants			*1,033*		*75*			*1,108*	
Thermal and Moisture Protection		*/ls*	*1,033*	*/ls*	*75*		*/ls*	*1,108*	
080000.00 Openings									
080505.20 Selective Demolition Of Glazing									
Window demolition, aluminum, including trim, to 35 s.f	1.00 ea	194.06 /ea	194	-	-	-	194.06 /ea	194	
Selective Demolition Of Glazing			*194*					*194*	
085113.20 Aluminum Windows									
Aluminum wdws, 1"th dbl glazed, tempered, (2) 1/4" tinted insul glass, 1/2" airs pace	16.00 sf	16.95 /sf	271	98.72 /sf	1,580	-	115.67 /sf	1,851	
Aluminum Windows			*271*		*1,580*			*1,851*	
Openings		*/ls*	*465*	*/ls*	*1,580*		*/ls*	*2,045*	
A091			*1,860*		*1,655*			*3,514*	
A092									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	0.75 hr	72.49 /hr	54	-	-	-	72.49 /hr	54	
			54					*54*	
General Requirements		*/ls*	*54*	*/ls*			*/ls*	*54*	
070000.00 Thermal and Moisture Protection									
074473.10 Siding Accessories									
Metal facing pnl, smooth SS, 1/4" panel, clear finish, single faced	12.00 sf	15.65 /sf	188	42.73 /sf	513	-	58.38 /sf	701	
Siding Accessories			*188*		*513*			*701*	
Thermal and Moisture Protection		*/ls*	*188*	*/ls*	*513*		*/ls*	*701*	
090000.00 Finishes									
099713.23 Misc Repairs & Cleaning									
Remove Peeling/Cracking Paint and Prepare for New Paint	12.00 sf	5.36 /sf	64	0.25 /sf	3	-	5.61 /sf	67	
Misc Repairs & Cleaning			*64*		*3*			*67*	

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
Finishes		/ls	*64*	/ls	*3*		/ls	*67*	
A092			*306*		*516*			*822*	
A093									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	23.50 hr	72.48 /hr	1,703	-	-	-	72.48 /hr	1,703	
			1,703					*1,703*	
General Requirements		/ls	*1,703*	/ls			/ls	*1,703*	
050000.00 Metals									
050505.10 Selective Metals Demolition									
Remove Metal Guardrail	62.00 lf	14.43 /lf	894	-	-	-	14.43 /lf	894	
Selective Metals Demolition			*894*					*894*	
055133.13 Vertical Metal Ladders									
Expansion Bolt, 1/2" x 6", incl. layout & drill & fastner	51.00 ea	61.76 /ea	3,150	14.24 /ea	726	266	81.23 /ea	4,143	
Vertical Metal Ladders			*3,150*		*726*	*266*		*4,143*	
057323.50 Metal Railing									
Guard Rail 42" high,1 1/2" dia. galv., inc. horiz. rails @ 42" & 21', inc. vertical posts every 5'	62.00 lf	63.11 /lf	3,913	106.56 /lf	6,606		169.67 /lf	10,519	D
Guard Rail 42" high,1 1/2" dia. galv., inc. horiz. rails @ 42" & 21', inc. vertical posts every 5'	10.00 lf	63.11 /lf	631	106.56 /lf	1,066		169.67 /lf	1,697	D
Metal Railing			*4,544*		*7,672*			*12,216*	
Metals		/ls	*8,588*	/ls	*8,398*	*266*	/ls	*17,253*	
A093			*10,291*		*8,398*	*266*		*18,956*	
01 Architectural		/ls	*339,125*	/ls	*249,849*	*10,773*	/ls	*599,747*	
02 Mechanical									
M001									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	24.00 hr	72.48 /hr	1,739	-	-	-	72.48 /hr	1,739	
			1,739					*1,739*	
General Requirements		/ls	*1,739*	/ls			/ls	*1,739*	
230000.00 HVAC Components									
230505.10 Mech Labor									
HVAC demo, compressor	2.00 ea	2,395.43 /ea	4,791	-	-	84	2,437.63 /ea	4,875	D
HVAC demo, air dryer	2.00 ea	2,395.42 /ea	4,791	-	-	84	2,437.62 /ea	4,875	D
Mech Labor			*9,582*			*169*		*9,751*	
230923.10 Control Systems									
Control ddc,incl m&l,digital points	81.00 pt	531.40 /pt	43,044	2,059.31 /pt	166,804	-	2,590.71 /pt	209,848	
Control ddc sys, incl m&l, FE costs, computer (p.c.)/software program	5.00 ea	-	-	-	-	-	11,423.59 /ea	57,118	D
Control ddc sys, incl m&l, FE costs, computer (p.c.)/software program	5.00 ea	-	-	-	-	-	11,423.59 /ea	57,118	
Control ddc sys, incl m&l, FE costs, DEMO Point	81.00 pnt	-	-	-	-	-	144.70 /pnt	11,721	

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
230923.10 Control Systems									
Control ddc sys, incl m&l, FE costs, DEMO central controller and head-end computer	10.00 pnt	-	-	-	-	-	915.00 /pnt	9,150	
Control Systems			*43,044*		*166,804*			*344,954*	
230943.10 Control Systems									
Control pneu. sys, incl m&l, FE costs, disconnect	80.00 pnt			34.48 /pnt	2,758	2,758	128.78 /pnt	10,302	
Control pneu., incl m&l, pneumatic control point	80.00 pnt			2,057.25 /pnt	164,580	-	2,057.25 /pnt	164,580	
Control Systems					*167,338*	*2,758*		*174,882*	
HVAC Components		*/ls*	*52,625*	*/ls*	*334,142*	*2,927*	*/ls*	*529,587*	
M001		*/ls*	*54,365*	*/ls*	*334,142*	*2,927*	*/ls*	*531,326*	
M002									
230000.00 HVAC Components									
233113.13 Galvanized Metal Ducts									
Clean ductwork	1.00 ls	14,030.50 /ls	14,031			-	14,030.50 /ls	14,031	
Galvanized Metal Ducts			*14,031*					*14,031*	
HVAC Components		*/ls*	*14,031*	*/ls*			*/ls*	*14,031*	
M002		*/ls*	*14,031*	*/ls*			*/ls*	*14,031*	
M012									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	21.49 hr	72.48 /hr	1,558	-	-	-	72.48 /hr	1,558	
			1,558					*1,558*	
General Requirements		*/ls*	*1,558*	*/ls*			*/ls*	*1,558*	
220000.00 Plumbing									
220505.10 Plumbing Labor									
Plumbing Labor, Plumber, Foreman	36.00 hr	194.92 /hr	7,017			-	194.92 /hr	7,017	
Plumbing Labor			*7,017*					*7,017*	
220523.20 Valves, Bronze									
Valves, bronze, ball, 150 psi, threaded, 1"	2.00 ea	82.07 /ea	164	50.73 /ea	101	-	132.80 /ea	266	
Valves, Bronze			*164*		*101*			*266*	
220719.10 Piping Insulation									
Insulation, pipe covering, fbgls, all svce jkt, 1" wall, 1" IPS	10.00 lf	11.67 /lf	117	2.66 /lf	27	-	14.32 /lf	143	
Piping Insulation			*117*		*27*			*143*	
221113.23 Pipe, Copper									
Pipe cu solder joints, type L tubing, 1" dia incld fittings and hangers	10.00 lf	27.48 /lf	275	22.68 /lf	227	-	50.17 /lf	502	
Pipe, Copper			*275*		*227*			*502*	
Plumbing		*/ls*	*7,573*	*/ls*	*355*		*/ls*	*7,927*	
230000.00 HVAC Components									
232120.46 Tank									
Chemical Pot Feeder, 2 gallon	1.00 ea	357.10 /ea	357	761.71 /ea	762	-	1,118.81 /ea	1,119	
Tank			*357*		*762*			*1,119*	
HVAC Components		*/ls*	*357*	*/ls*	*762*		*/ls*	*1,119*	
23-00-00.00 HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)									

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
23-05-05.10 HVAC Demolition									
HVAC, Water Treatment Service Contract	2.00 yr	175.39 /yr	351	-	-	-	5,665.39 /yr	11,331	
HVAC Demolition			*351*					*11,331*	
HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)		*/ls*	*351*	*/ls*			*/ls*	*11,331*	
M012		*/ls*	*9,838*	*/ls*	*1,117*		*/ls*	*21,935*	
M013									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	55.33 hr	72.48 /hr	4,010	-	-	-	72.48 /hr	4,010	
			4,010					*4,010*	
General Requirements		*/ls*	*4,010*	*/ls*			*/ls*	*4,010*	
220000.00 Plumbing									
220505.10 Plumbing Labor									
Plumbing dml, piping, metal, 2" thru 3-1/2" dia	10.00 lf	10.39 /lf	104	-	-	-	10.39 /lf	104	
Plumbing Labor			*104*					*104*	
221113.44 Pipe, Steel									
Pipe st, sched 40, thrded, bk, 2" dia.incld fittings and hangers	10.00 lf	52.63 /lf	526	19.63 /lf	196	-	72.25 /lf	723	
Pipe, Steel			*526*		*196*			*723*	
221113.74 Pipe, Plastic - Flex Connections									
Pipe, PVC hi imp/press, sched 80, 4" dia incld fittings and hangers	50.00 lf	73.22 /lf	3,661	30.37 /lf	1,518	-	103.59 /lf	5,180	
Pipe, Plastic - Flex Connections			*3,661*		*1,518*			*5,180*	
Plumbing		*/ls*	*4,291*	*/ls*	*1,715*		*/ls*	*6,006*	
230000.00 HVAC Components									
230505.10 Mech Labor									
HVAC dml, boiler, gas and or oil, 160 thru 2000 MBH	1.00 ea	7,555.91 /ea	7,556	-	-	633	8,188.91 /ea	8,189	
Mech Labor			*7,556*			*633*		*8,189*	
235223.20 Gas-Fired Boilers,									
Boilers, gas fir, std cont, CI, W/insul jkt, stm, GR out, 419 MBH	1.00 ea	13,522.90 /ea	13,523	18,324.72 /ea	18,325	-	31,847.62 /ea	31,848	
Gas-Fired Boilers,			*13,523*		*18,325*			*31,848*	
HVAC Components		*/ls*	*21,079*	*/ls*	*18,325*	*633*	*/ls*	*40,037*	
260000.00 Electrical									
260590.10 Residential Wiring									
Electrician, labor - Reuse Electrical components	4.00 hr	180.25 /hr	721			-	180.25 /hr	721	
Residential Wiring			*721*					*721*	
Electrical		*/ls*	*721*	*/ls*			*/ls*	*721*	
22-05-00.00 Common Work Results For Plumbing									
22-05-05.10 Plumbing Demolition									
Pipe, metal pipe, 8" to 14" diam., selective demolition	20.00 lf	24.17 /lf	483	-	-	-	24.17 /lf	483	

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
Plumbing Demolition			*483*					*483*	
Common Work Results For Plumbing			*483*					*483*	
M013		*/ls*	*30,585*	*/ls*	*20,039*	*633*	*/ls*	*51,257*	
M013A									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	7.31 hr	72.48 /hr	530	-	-	-	72.48 /hr	530	
			530					*530*	
General Requirements		*/ls*	*530*	*/ls*			*/ls*	*530*	
220000.00 Plumbing									
220505.10 Plumbing Labor									
Plumbing dml, piping, metal, up thru 1-1/2" dia	50.00 lf	7.80 /lf	390	-	-	-	7.80 /lf	390	
Plumbing Labor			*390*					*390*	
220523.20 Valves, Bronze									
Valves, bronze, ball, 150 psi, threaded, 1-1/2"	1.00 ea	119.97 /ea	120	68.99 /ea	69	-	188.96 /ea	189	
Valves, Bronze			*120*		*69*			*189*	
221113.44 Pipe, Steel									
Pipe st, sch 40, thrded, bk, 1-1/2" dia incld fittings and hangers	50.00 lf	42.10 /lf	2,105	14.66 /lf	733	-	56.76 /lf	2,838	
Pipe, Steel			*2,105*		*733*			*2,838*	
Plumbing		*/ls*	*2,615*	*/ls*	*802*		*/ls*	*3,417*	
M013A			*3,145*		*802*			*3,947*	
M014									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	48.21 hr	72.48 /hr	3,494	-	-	-	72.48 /hr	3,494	
			3,494					*3,494*	
General Requirements		*/ls*	*3,494*	*/ls*			*/ls*	*3,494*	
220000.00 Plumbing									
220505.10 Plumbing Labor									
Plumbing dml, piping, metal, 2" thru 3-1/2" dia	20.00 lf	10.40 /lf	208	-	-	-	10.40 /lf	208	
Plumbing Labor			*208*					*208*	
221113.44 Pipe, Steel									
Pipe st, sched 40, thrded, bk, 2" dia.incld fittings and hangers	20.00 lf	52.63 /lf	1,053	19.63 /lf	393	-	72.25 /lf	1,445	
Pipe, Steel			*1,053*		*393*			*1,445*	
Plumbing		*/ls*	*1,260*	*/ls*	*393*		*/ls*	*1,653*	
230000.00 HVAC Components									
230505.10 Mech Labor									
HVAC demo, central station air handler unit, 17.5 thru 30 ton	1.00 ea	3,571.24 /ea	3,571	-	-	422	3,993.24 /ea	3,993	D
Mech Labor			*3,571*			*422*		*3,993*	
237313.10 Air Handling Units									

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
237313.10 Air Handling Units									
Air handling unit, built-up, multi-zone, horiz/vert, 8000 CFM	1.00 ea	22,610.72 /ea	22,611	61,359.91 /ea	61,360	429	84,400.03 /ea	84,400	D
Air Handling Units			*22,611*		*61,360*	*429*		*84,400*	
HVAC Components		*/ls*	*26,182*	*/ls*	*61,360*	*851*	*/ls*	*88,393*	
260000.00 Electrical									
260590.10 Residential Wiring									
Electrician, labor - Reuse Electrical components	8.00 hr	180.25 /hr	1,442			-	180.25 /hr	1,442	
Residential Wiring			*1,442*					*1,442*	
262419.40 Motor Starters And Controls									
Motor starters & controls, magnetic, FVNR, NEMA 7, 5 HP, size 0	1.00 ea	702.98 /ea	703	2,383.39 /ea	2,383	-	3,086.37 /ea	3,086	
Motor Starters And Controls			*703*		*2,383*			*3,086*	
Electrical		*/ls*	*2,145*	*/ls*	*2,383*		*/ls*	*4,528*	
M014		*/ls*	***33,082***	*/ls*	***64,136***	***851***	*/ls*	***98,069***	
M014A									
010000.00 General Requirements									
013113.20									
Field personnel, HVAC Technician, Clean condensate drain	2.00 hr	263.75 /hr	528	-	-	-	263.75 /hr	528	
			528					*528*	
General Requirements		*/ls*	*528*	*/ls*			*/ls*	*528*	
M014A			***528***					***528***	
M015									
010000.00 General Requirements									
013113.20									
Field personnel, HVAC Technician, incld parts for repair	8.00 hr	263.75 /hr	2,110	263.75 /hr	***2,110***	-	527.50 /hr	4,220	
			2,110		*2,110*			*4,220*	
General Requirements		*/ls*	*2,110*	*/ls*	*2,110*		*/ls*	*4,220*	
M015		*/ls*	***2,110***	*/ls*	***2,110***		*/ls*	***4,220***	
M016									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	38.53 hr	72.48 /hr	2,793	-	-	-	72.48 /hr	2,793	
			2,793					*2,793*	
General Requirements		*/ls*	*2,793*	*/ls*			*/ls*	*2,793*	
230000.00 HVAC Components									
230505.10 Mech Labor									
HVAC demo, central station air handler unit, up thru 15 ton	1.00 ea	1,785.63 /ea	1,786	-	-	422	2,207.63 /ea	2,208	D
Mech Labor			*1,786*			*422*		*2,208*	
237313.10 Air Handling Units									

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
237313.10 Air Handling Units									
Air handling unit, built-up, single zone, horiz/vert, 4000 CFM	1.00 ea	9,923.63 /ea	9,924	32,276.37 /ea	32,276	-	42,200.00 /ea	42,200	D
Air Handling Units			*9,924*		*32,276*			*42,200*	
HVAC Components		*/ls*	*11,709*	*/ls*	*32,276*	*422*	*/ls*	*44,408*	
260000.00 Electrical									
260590.10 Residential Wiring									
Electrician, labor - Reuse Electrical components	8.00 hr	180.25 /hr	1,442			-	180.25 /hr	1,442	
Residential Wiring			*1,442*					*1,442*	
Electrical		*/ls*	*1,442*	*/ls*			*/ls*	*1,442*	
26-28-16.00 Enclosed Switches And Circuit Breakers									
26-28-16.20 Safety Switches									
Disconnect switch, 3 pole fusible, 60 amp, to 30 HP motor, 600 volt	1.00 ea	224.43 /ea	224	1,823.53 /ea	1,824	-	2,047.96 /ea	2,048	
Safety Switches			*224*		*1,824*			*2,048*	
Enclosed Switches And Circuit Breakers			*224*		*1,824*			*2,048*	
M016		*/ls*	*16,168*	*/ls*	*34,100*	*422*	*/ls*	*50,690*	
M016A									
010000.00 General Requirements									
013113.20									
Field personnel, HVAC Technician	8.00 hr	263.75 /hr	2,110	-	-	-	263.75 /hr	2,110	
			2,110					*2,110*	
General Requirements		*/ls*	*2,110*	*/ls*			*/ls*	*2,110*	
M016A			*2,110*					*2,110*	
M017									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	0.75 hr	72.48 /hr	54	-	-	-	72.48 /hr	54	
Field personnel, HVAC Technician, Test & Balance	4.00 hr	263.75 /hr	1,055	-	-	-	263.75 /hr	1,055	
			1,109					*1,109*	
General Requirements		*/ls*	*1,109*	*/ls*			*/ls*	*1,109*	
230000.00 HVAC Components									
230953.10 Control Components									
Control components, carbon monoxide detector system, sensor	1.00 ea	297.61 /ea	298	961.60 /ea	962	-	1,259.21 /ea	1,259	
Control Components			*298*		*962*			*1,259*	
HVAC Components		*/ls*	*298*	*/ls*	*962*		*/ls*	*1,259*	
M017		*/ls*	*1,407*	*/ls*	*962*		*/ls*	*2,369*	
M018									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	18.40 hr	72.48 /hr	1,334	-	-	-	72.48 /hr	1,334	
			1,334					*1,334*	

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
General Requirements		/ls	*1,334*	/ls			/ls	*1,334*	
030000.00 Concrete									
038213.10 Core Drilling									
Drilling,core,CMU/Brick Wall,w/bit,layout&setup,2"diam core	1.00 ea	102.48 /ea	102	7.59 /ea	8	9	119.40 /ea	119	
Core Drilling			*102*		*8*	*9*		*119*	
Concrete		/ls	*102*	/ls	*8*	*9*	/ls	*119*	
220000.00 Plumbing									
220719.10 Piping Insulation									
Insulation, pipe coving, fbgl, W/all svce jkt, 1/2" wl, 3/8" IPS	20.00 lf	4.40 /lf	88	2.17 /lf	43	-	6.57 /lf	131	
Piping Insulation			*88*		*43*			*131*	
221113.23 Pipe, Copper									
Pipe cu solder jts, type L tubing, 3/8" dia incld fittings and hangers	20.00 lf	22.22 /lf	444	8.61 /lf	172	-	30.83 /lf	617	
Pipe cu solder jts, type L tubing, 3/4" dia incld fittings and hangers	10.00 lf	24.56 /lf	246	15.95 /lf	160	-	40.51 /lf	405	
Pipe, Copper			*690*		*332*			*1,022*	
Plumbing		/ls	*778*	/ls	*375*		/ls	*1,153*	
230000.00 HVAC Components									
236213.10 Air Conditioning Units									
Condensing units, air cooled, compressor, std controls, 1 ton	1.00 ea	1,142.80 /ea	1,143	1,681.58 /ea	1,682	-	2,824.38 /ea	2,824	
Air Conditioning Units			*1,143*		*1,682*			*2,824*	
238143.10 Heat Pump									
Heat pumps, air/air, split sys,excl curbs,12 MBH ht @ 0<F	1.00 ea	3,571.25 /ea	3,571	5,133.53 /ea	5,134	-	8,704.78 /ea	8,705	
Heat Pump			*3,571*		*5,134*			*8,705*	
HVAC Components		/ls	*4,714*	/ls	*6,815*		/ls	*11,529*	
260000.00 Electrical									
260519.90 Wire									
Wire, 600 volt, type THW, copper, stranded, #12 - power	1.05 clf	131.06 /clf	138	40.52 /clf	43	-	171.58 /clf	180	
Wire			*138*		*43*			*180*	
260533.10 Conduit									
Conduit to 15' H, incl couplings only, elec metallic tubing, 1/2" dia - power	35.00 lf	3.31 /lf	116	1.20 /lf	42	-	4.51 /lf	158	
Conduit			*116*		*42*			*158*	
262419.40 Motor Starters And Controls									
Standard equipment disconnect - 30 Amp	1.00 ea	360.49 /ea	360	305.95 /ea	306	-	666.44 /ea	666	
Motor Starters And Controls			*360*		*306*			*666*	
Electrical		/ls	*614*	/ls	*390*		/ls	*1,004*	
03-00-00.00 CONCRETE									
03-30-53.40 Concrete In Place									
Struct concrete,place,equipment pad (3000 psi),4'x4'x6"	1.00 ea	109.53 /ea	110	157.66 /ea	158	3	269.74 /ea	270	

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
Concrete In Place			*110*		*158*	*3*		*270*	
CONCRETE		*/ls*	*110*	*/ls*	*158*	*3*	*/ls*	*270*	
M018		*/ls*	*7,652*	*/ls*	*7,746*	*12*	*/ls*	*15,409*	
02 Mechanical		*/ls*	*175,019*	*/ls*	*465,153*	*4,845*	*/ls*	*795,889*	
03 Plumbing									
P002									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	7.50 hr	72.48 /hr	544	-	-	-	72.48 /hr	544	
			544					*544*	
General Requirements		*/ls*	*544*	*/ls*			*/ls*	*544*	
22-11-19.00 Domestic Water Piping Specialties									
22-13-16.60 Traps									
SureSeal Inline Floor Drain Trap Seal	10.00 ea	283.66 /ea	2,837	105.50 /ea	1,055	-	389.16 /ea	3,892	
Traps			*2,837*		*1,055*			*3,892*	
Domestic Water Piping Specialties			*2,837*		*1,055*			*3,892*	
P002		*/ls*	*3,380*	*/ls*	*1,055*		*/ls*	*4,435*	
P004									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	7.01 hr	72.48 /hr	508	-	-	-	72.48 /hr	508	
			508					*508*	
General Requirements		*/ls*	*508*	*/ls*			*/ls*	*508*	
030000.00 Concrete									
038213.10 Core Drilling									
Drilling,core,CMU/Brick Wall,w/bit,layout&setup,2"diam core	1.00 ea	102.51 /ea	103	7.58 /ea	8	9	119.40 /ea	119	
Core Drilling			*103*		*8*	*9*		*119*	
Concrete		*/ls*	*103*	*/ls*	*8*	*9*	*/ls*	*119*	
110000.00 Equipment									
112419.10 Vacuum Equipment									
Vacuum cleaning system, central, 3 inlet, residential, w/accessory kit	1.00 totl	1,471.20 /totl	1,471	1,690.35 /totl	1,690	-	3,161.55 /totl	3,162	
Vacuum cleaning system, central, 2" vac tubing	40.00 ft	8.28 /ft	331	1.79 /ft	72	-	10.07 /ft	403	
Vacuum cleaning system, central, elbows or tees	5.00 ea	24.83 /ea	124	8.44 /ea	42	-	33.27 /ea	166	
Vacuum cleaning system, central, Wall Outlet	1.00 ea	82.77 /ea	83	16.88 /ea	17	-	99.65 /ea	100	
Vacuum cleaning system, central, exterior wall cap	1.00 ea	82.74 /ea	83	47.46 /ea	47	-	130.20 /ea	130	
Vacuum Equipment			*2,092*		*1,869*			*3,960*	
Equipment		*/ls*	*2,092*	*/ls*	*1,869*		*/ls*	*3,960*	
260000.00 Electrical									
260519.90 Wire									
Wire, 600 volt, type THW, copper, stranded, #12 - power	0.60 clf	131.15 /clf	79	40.45 /clf	24	-	171.60 /clf	103	

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
Wire			*79*		*24*			*103*	
260533.10 Conduit									
Conduit to 15' H, incl couplings only, elec metallic tubing, 1/2" dia - power	20.00 lf	3.32 /lf	66	1.19 /lf	24	-	4.51 /lf	90	
Conduit			*66*		*24*			*90*	
Electrical		*/ls*	*145*	*/ls*	*48*		*/ls*	*193*	
P004		*/ls*	*2,847*	*/ls*	*1,924*	*9*	*/ls*	*4,781*	
03 Plumbing		*/ls*	*6,228*	*/ls*	*2,979*	*9*	*/ls*	*9,216*	
04 Fire Protection									
F003									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	7.63 hr	72.48 /hr	553	-	-	-	72.48 /hr	553	
			553					*553*	
General Requirements		*/ls*	*553*	*/ls*			*/ls*	*553*	
110000.00 Equipment									
113113.53									
Range hood,residential appliances,vented,min,2 speed,30"wide,minimum - DEMO	1.00 ea	342.83 /ea	343			-	342.83 /ea	343	D
Range hood,residential appliances,vented,min,2 speed,30"wide,minimum, Broan 42.000-d	1.00 ea	342.84 /ea	343	296.68 /ea	297	-	639.52 /ea	640	D
113113.53			*686*		*297*			*982*	
Equipment		*/ls*	*686*	*/ls*	*297*		*/ls*	*982*	
120000.00 Furnishings									
123213.10 Cabinets / Counters / Shelves									
Kitchen Wall Cabinets	2.50 lf	144.00 /lf	360	242.66 /lf	607	-	386.66 /lf	967	
Cabinets / Counters / Shelves			*360*		*607*			*967*	
Furnishings		*/ls*	*360*	*/ls*	*607*		*/ls*	*967*	
210000.00 Fire Suppression									
210523.50									
Fire Suppression System, Guardian G300-B-G322	1.00 ea	1,006.80 /ea	1,007	3,977.35 /ea	3,977	-	4,984.15 /ea	4,984	
210523.50			*1,007*		*3,977*			*4,984*	
Fire Suppression		*/ls*	*1,007*	*/ls*	*3,977*		*/ls*	*4,984*	
280000.00 Electronic Safety and Security									
281616.50 Detection Devices									
Detection systems, connect device to FACP, new point	1.00 ea	540.76 /ea	541	263.75 /ea	264	-	804.51 /ea	805	
Detection Devices			*541*		*264*			*805*	
Electronic Safety and Security		*/ls*	*541*	*/ls*	*264*		*/ls*	*805*	
F003		*/ls*	*3,146*	*/ls*	*5,144*		*/ls*	*8,291*	
F004									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	8.22 hr	72.48 /hr	596	-	-	-	72.48 /hr	596	

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
			596					*596*	
General Requirements		*/ls*	*596*	*/ls*			*/ls*	*596*	
110000.00 Equipment									
113113.53									
Range hood,residential appliances,vented,min,2 speed,30"wide,minimum, Broan 42.000-d	1.00 ea	342.83 /ea	343	296.68 /ea	297	-	639.51 /ea	640	
113113.53			*343*		*297*			*640*	
114813.10 Appliances									
Remove Microwave Oven	1.00 ea	350.88 /ea	351			-	350.88 /ea	351	
Appliances			*351*					*351*	
Equipment		*/ls*	*694*	*/ls*	*297*		*/ls*	*990*	
120000.00 Furnishings									
123213.10 Cabinets / Counters / Shelves									
Kitchen Wall Cabinets	2.50 lf	144.00 /lf	360	242.64 /lf	607	-	386.64 /lf	967	
DEMO Wall Cabinets	2.50 lf	74.61 /lf	187			-	74.61 /lf	187	
Cabinets / Counters / Shelves			*547*		*607*			*1,153*	
Furnishings		*/ls*	*547*	*/ls*	*607*		*/ls*	*1,153*	
210000.00 Fire Suppression									
210523.50									
Fire Suppression System, Guardian G300-B-G322	1.00 ea	1,006.84 /ea	1,007	3,977.35 /ea	3,977	-	4,984.19 /ea	4,984	
210523.50			*1,007*		*3,977*			*4,984*	
Fire Suppression		*/ls*	*1,007*	*/ls*	*3,977*		*/ls*	*4,984*	
280000.00 Electronic Safety and Security									
281616.50 Detection Devices									
Detection systems, connect device to FACP, new point	1.00 ea	540.73 /ea	541	263.75 /ea	264	-	804.48 /ea	804	
Detection Devices			*541*		*264*			*804*	
Electronic Safety and Security		*/ls*	*541*	*/ls*	*264*		*/ls*	*804*	
F004		*/ls*	*3,384*	*/ls*	*5,144*		*/ls*	*8,528*	
04 Fire Protection		*/ls*	*6,530*	*/ls*	*10,289*		*/ls*	*16,819*	
05 Electrical									
E042B									
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									
Labor	30.00 hr	127.17 /hr	3,815			-	127.17 /hr	3,815	
Panelboards, 3 phase 4 wire, main circuit breaker, 120/208 V, 225 amp, 42 circuits, NQOD, incl 20 A 1 pole plug-in breakers	2.00 ea	2,874.08 /ea	5,748	4,779.15 /ea	9,558	-	7,653.23 /ea	15,306	D
Panelboards, 3 phase 4 wire, main circuit breaker, 208 V, 225 amp, 18 circuits, NQOD, incl 20 A 1 pole plug-in breakers	1.00 ea	2,289.10 /ea	2,289	5,064.00 /ea	5,064	-	7,353.10 /ea	7,353	D
Panelboards, 3 phase 4 wire, main circuit breaker, 208/120 V, 600 amp, 30 circuits, NQOD, incl 20 A 1 pole plug-in breakers	1.00 ea	5,086.86 /ea	5,087	14,453.50 /ea	14,454	-	19,540.36 /ea	19,540	D

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
Panelboards Commercial Applications			*16,939*		*29,076*			*46,015*	
Panelboards			*16,939*		*29,076*			*46,015*	
E042B			*16,939*		*29,076*			*46,015*	
E043A									
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									
Panelboards, 1 phase 3 wire, main circuit breaker, 120/208 V, 100 amp, 18 circuits, NQOD, incl 20 A 1 pole plug-in breakers	1.00 ea	1,526.05 /ea	1,526	2,749.41 /ea	2,749	-	4,275.46 /ea	4,275	
Labor	8.00 hr	127.17 /hr	1,017			-	127.17 /hr	1,017	
Panelboards Commercial Applications			*2,543*		*2,749*			*5,293*	
Panelboards			*2,543*		*2,749*			*5,293*	
E043A		*/****	*2,543*	*/****	*2,749*		*/****	*5,293*	
E044B									
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									
Panelboards, 3 phase 4 wire, main circuit breaker, 120/208 V, 225 amp, 18 circuits, NQOD, incl 20 A 1 pole plug-in breakers	1.00 ea	2,289.09 /ea	2,289	5,064.00 /ea	5,064	-	7,353.09 /ea	7,353	
Labor	8.00 hr	127.17 /hr	1,017			-	127.17 /hr	1,017	
Panelboards Commercial Applications			*3,306*		*5,064*			*8,370*	
Panelboards			*3,306*		*5,064*			*8,370*	
E044B			*3,306*		*5,064*			*8,370*	
E045A									
26-05-19.00 Low-Voltage Electrical Power Conductors And Cables									
26-05-19.90 Wire									
Wire, copper, solid, 600 volt, #10, type THWN-THHN, in raceway	1.50 clf	101.75 /clf	153	48.86 /clf	73	-	150.61 /clf	226	
Wire			*153*		*73*			*226*	
Low-Voltage Electrical Power Conductors And Cables			*153*		*73*			*226*	
26-05-33.00 Raceway And Boxes For Electrical Systems									
26-05-33.05 Conduit									
Rigid galvanized steel conduit, 3/4" diameter, to 15' H, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	20.00 lf	12.72 /lf	254	7.75 /lf	155	-	20.47 /lf	409	
Conduit			*254*		*155*			*409*	
Raceway And Boxes For Electrical Systems			*254*		*155*			*409*	
26-24-16.00 Panelboards									
26-24-16.20 Panelboard And Load Center Circuit Breakers									
Circuit breakers, bolt-on, 10 k A I.C., 3 pole, 240 volt, 15 to 60 amp	10.00 ea	164.09 /ea	1,641	257.51 /ea	2,575	-	421.61 /ea	4,216	
Panelboard And Load Center Circuit Breakers			*1,641*		*2,575*			*4,216*	
26-24-16.30 Panelboards Commercial Applications									
Labor	20.00 hr	127.17 /hr	2,543			-	127.17 /hr	2,543	
Panelboards Commercial Applications			*2,543*					*2,543*	

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
Panelboards			*4,184*		*2,575*			*6,760*	
26-28-16.00 Enclosed Switches And Circuit Breakers									
26-35-26.40 Transient Voltage Suppressor Transformer									
Transient voltage suppressor for panels	10.00 ea	381.51 /ea	3,815	2,142.39 /ea	21,424	-	2,523.90 /ea	25,239	
Transient Voltage Suppressor Transformer			*3,815*		*21,424*			*25,239*	
Enclosed Switches And Circuit Breakers			*3,815*		*21,424*			*25,239*	
E045A		*/****	*8,407*	*/****	*24,227*		*/****	*32,634*	
E046A									
26-05-19.00 Low-Voltage Electrical Power Conductors And Cables									
26-05-19.90 Wire									
Wire, copper, solid, 600 volt, #10, type THWN-THHN, in raceway	0.15 clf	101.50 /clf	15	48.87 /clf	7	-	150.40 /clf	23	
Wire			*15*		*7*			*23*	
Low-Voltage Electrical Power Conductors And Cables			*15*		*7*			*23*	
26-05-33.00 Raceway And Boxes For Electrical Systems									
26-05-33.05 Conduit									
Rigid galvanized steel conduit, 3/4" diameter, to 15' H, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	10.00 lf	12.72 /lf	127	7.75 /lf	77	-	20.47 /lf	205	
Conduit			*127*		*77*			*205*	
Raceway And Boxes For Electrical Systems			*127*		*77*			*205*	
26-24-16.00 Panelboards									
26-24-16.20 Panelboard And Load Center Circuit Breakers									
Circuit breakers, bolt-on, 10 k A I.C., 3 pole, 240 volt, 15 to 60 amp	1.00 ea	164.11 /ea	164	257.48 /ea	257	-	421.59 /ea	422	
Panelboard And Load Center Circuit Breakers			*164*		*257*			*422*	
26-24-16.30 Panelboards Commercial Applications									
Labor	2.00 hr	127.18 /hr	254			-	127.18 /hr	254	
Panelboards Commercial Applications			*254*					*254*	
Panelboards			*418*		*257*			*676*	
26-28-16.00 Enclosed Switches And Circuit Breakers									
26-35-26.40 Transient Voltage Suppressor Transformer									
Transient voltage suppressor for panels	1.00 ea	381.52 /ea	382	2,142.37 /ea	2,142	-	2,523.89 /ea	2,524	
Transient Voltage Suppressor Transformer			*382*		*2,142*			*2,524*	
Enclosed Switches And Circuit Breakers			*382*		*2,142*			*2,524*	
E046A		*/****	*942*	*/****	*2,485*		*/****	*3,427*	
E046B									
26-05-19.00 Low-Voltage Electrical Power Conductors And Cables									
26-05-19.90 Wire									
Wire, copper, solid, 600 volt, #10, type THWN-THHN, in raceway	0.75 clf	101.75 /clf	76	48.84 /clf	37	-	150.59 /clf	113	
Wire			*76*		*37*			*113*	
Low-Voltage Electrical Power Conductors And Cables			*76*		*37*			*113*	
26-05-33.00 Raceway And Boxes For Electrical Systems									
26-05-33.05 Conduit									

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
26-05-33.05 Conduit									
Rigid galvanized steel conduit, 3/4" diameter, to 15' H, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	10.00 lf	12.72 /lf	127	7.75 /lf	77	-	20.47 /lf	205	
Conduit			*127*		*77*			*205*	
Raceway And Boxes For Electrical Systems			*127*		*77*			*205*	
26-24-16.00 Panelboards									
26-24-16.20 Panelboard And Load Center Circuit Breakers									
Circuit breakers, bolt-on, 10 k A I.C., 3 pole, 240 volt, 15 to 60 amp	5.00 ea	164.09 /ea	820	257.52 /ea	1,288	-	421.61 /ea	2,108	
Panelboard And Load Center Circuit Breakers			*820*		*1,288*			*2,108*	
26-24-16.30 Panelboards Commercial Applications									
Labor	10.00 hr	127.17 /hr	1,272			-	127.17 /hr	1,272	
Panelboards Commercial Applications			*1,272*					*1,272*	
Panelboards			*2,092*		*1,288*			*3,380*	
26-28-16.00 Enclosed Switches And Circuit Breakers									
26-35-26.40 Transient Voltage Suppressor Transformer									
Transient voltage suppressor for panels	5.00 ea	381.52 /ea	1,908	2,142.39 /ea	10,712	-	2,523.91 /ea	12,620	
Transient Voltage Suppressor Transformer			*1,908*		*10,712*			*12,620*	
Enclosed Switches And Circuit Breakers			*1,908*		*10,712*			*12,620*	
E046B			*4,203*		*12,114*			*16,317*	
E047A									
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									
Labor to remove circuits	9.00 hr	127.17 /hr	1,145			-	127.17 /hr	1,145	
Panelboards Commercial Applications			*1,145*					*1,145*	
Panelboards			*1,145*					*1,145*	
E047A		*/****	*1,145*	*/****			*/****	*1,145*	
E048A									
26-05-19.00 Low-Voltage Electrical Power Conductors And Cables									
26-05-19.90 Wire									
Wire, copper, solid, 600 volt, #10, type THWN-THHN, in raceway	0.90 clf	101.76 /clf	92	48.89 /clf	44	-	150.64 /clf	136	
Wire			*92*		*44*			*136*	
Low-Voltage Electrical Power Conductors And Cables			*92*		*44*			*136*	
26-05-33.00 Raceway And Boxes For Electrical Systems									
26-05-33.13 Conduit									
Rigid galvanized steel conduit, 1" diameter, to 10' H, incl 2 terminations, 2 elbows, 11 beam clamps, and 11 couplings per 100 LF	30.00 lf	15.65 /lf	470	15.82 /lf	475	-	31.48 /lf	944	
Conduit			*470*		*475*			*944*	
Raceway And Boxes For Electrical Systems			*470*		*475*			*944*	
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									
Labor	1.00 hr	127.17 /hr	127			-	127.17 /hr	127	

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
Panelboards Commercial Applications			*127*					*127*	
Panelboards			*127*					*127*	
E048A		*/*****	*688*	*/*****	*519*		*/*****	*1,207*	
E049A									
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									
Labor to remove circuits	24.00 hr	127.17 /hr	3,052			-	127.17 /hr	3,052	
Panelboards Commercial Applications			*3,052*					*3,052*	
Panelboards			*3,052*					*3,052*	
E049A		*/*****	*3,052*	*/*****			*/*****	*3,052*	
E050B									
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									
Labor to remove circuits	9.00 hr	127.17 /hr	1,145			-	127.17 /hr	1,145	
Panelboards Commercial Applications			*1,145*					*1,145*	
Panelboards			*1,145*					*1,145*	
E050B			*1,145*					*1,145*	
E051B									
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									
Labor	1.00 hr	127.19 /hr	127			-	127.19 /hr	127	
Panelboards Commercial Applications			*127*					*127*	
Panelboards			*127*					*127*	
E051B			*127*					*127*	
E052B									
26-24-16.00 Panelboards									
26-24-16.20 Panelboard And Load Center Circuit Breakers									
Circuit breakers, bolt-on, 10 k A I.C., 2 pole, 240 volt, 15 to 50 amp	1.00 ea	127.17 /ea	127	113.35 /ea	113	-	240.52 /ea	241	
Panelboard And Load Center Circuit Breakers			*127*		*113*			*241*	
Panelboards			*127*		*113*			*241*	
E052B			*127*		*113*			*241*	
E053B									
26-24-16.00 Panelboards									
26-24-16.20 Panelboard And Load Center Circuit Breakers									
Circuit breakers, bolt-on, 10 k A I.C., 1 pole, 120 volt, 15 to 50 amp	1.00 ea	101.73 /ea	102	42.40 /ea	42	-	144.13 /ea	144	
Panelboard And Load Center Circuit Breakers			*102*		*42*			*144*	
Panelboards			*102*		*42*			*144*	
E053B			*102*		*42*			*144*	
E054B									
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									
Space Covers	1.00 ea	63.62 /ea	64	2.89 /ea	3	-	66.51 /ea	67	
Panelboards Commercial Applications			*64*		*3*			*67*	

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
Panelboards			*64*		*3*			*67*	
E054B			*64*		*3*			*67*	
E055A									
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									
Labor	8.00 hr	127.18 /hr	1,017			-	127.18 /hr	1,017	
Panelboards, 3 phase 4 wire, main circuit breaker, 208/120 V, 225 amp, 42 circuits, NQOD, incl 20 A 1 pole plug-in breakers	1.00 ea	3,633.47 /ea	3,633	8,640.98 /ea	8,641	-	12,274.45 /ea	12,274	
Panelboards Commercial Applications			*4,651*		*8,641*			*13,292*	
Panelboards			*4,651*		*8,641*			*13,292*	
E055A		*/****	*4,651*	*/****	*8,641*		*/****	*13,292*	
E056A									
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									
Panelboards, add new door in door and remove existing door	7.00 ea	63.58 /ea	445	846.76 /ea	5,927	-	910.34 /ea	6,372	
Panelboards Commercial Applications			*445*		*5,927*			*6,372*	
Panelboards			*445*		*5,927*			*6,372*	
E056A		*/****	*445*	*/****	*5,927*		*/****	*6,372*	
E056B									
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									
Panelboards, add new door in door and remove existing door	3.00 ea	63.59 /ea	191	846.75 /ea	2,540	-	910.34 /ea	2,731	
Panelboards Commercial Applications			*191*		*2,540*			*2,731*	
Panelboards			*191*		*2,540*			*2,731*	
E056B			*191*		*2,540*			*2,731*	
E057A									
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									
Knock out Covers	1.00 ea	63.62 /ea	64	2.89 /ea	3	-	66.51 /ea	67	
Panelboards Commercial Applications			*64*		*3*			*67*	
Panelboards			*64*		*3*			*67*	
E057A		*/ls	*64*	*/ls	*3*		*/ls	*67*	
E057B									
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									
Knock out Covers	2.00 ea	63.59 /ea	127	2.92 /ea	6	-	66.51 /ea	133	
Panelboards Commercial Applications			*127*		*6*			*133*	
Panelboards			*127*		*6*			*133*	
E057B			*127*		*6*			*133*	
E058A									
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									
Labor	4.00 hr	127.17 /hr	509			-	127.17 /hr	509	

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
Panelboards Commercial Applications			*509*					*509*	
Panelboards			*509*					*509*	
E058A			*509*					*509*	
E058B									
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									
Labor	2.00 hr	127.18 /hr	254			-	127.18 /hr	254	
Panelboards Commercial Applications			*254*					*254*	
Panelboards			*254*					*254*	
E058B			*254*					*254*	
E059A									
26-05-33.00 Raceway And Boxes For Electrical Systems									
26-05-33.25 Conduit Fittings For Rigid Galvanized Steel									
Conduit fittings for rigid galvanized steel, grounding bushing, insulated, 3/4" diameter	4.00 ea	36.33 /ea	145	11.45 /ea	46	-	47.78 /ea	191	
Conduit Fittings For Rigid Galvanized Steel			*145*		*46*			*191*	
Raceway And Boxes For Electrical Systems			*145*		*46*			*191*	
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									
Labor	4.00 hr	127.17 /hr	509			-	127.17 /hr	509	
Panelboards Commercial Applications			*509*					*509*	
Panelboards			*509*					*509*	
E059A			*654*		*46*			*700*	
E060A									
26-05-33.00 Raceway And Boxes For Electrical Systems									
26-05-33.25 Conduit Fittings For Rigid Galvanized Steel									
Conduit fittings compression	10.00 ea	127.17 /ea	1,272	193.59 /ea	1,936	-	320.76 /ea	3,208	
Conduit Fittings For Rigid Galvanized Steel			*1,272*		*1,936*			*3,208*	
Raceway And Boxes For Electrical Systems			*1,272*		*1,936*			*3,208*	
E060A			*1,272*		*1,936*			*3,208*	
E060B									
26-05-33.00 Raceway And Boxes For Electrical Systems									
26-05-33.25 Conduit Fittings For Rigid Galvanized Steel									
Conduit fittings compression	12.00 ea	127.17 /ea	1,526	193.59 /ea	2,323	-	320.76 /ea	3,849	
Conduit Fittings For Rigid Galvanized Steel			*1,526*		*2,323*			*3,849*	
Raceway And Boxes For Electrical Systems			*1,526*		*2,323*			*3,849*	
E060B		*/ls*	*1,526*	*/ls*	*2,323*		*/ls*	*3,849*	
E061A									
26-05-19.00 Low-Voltage Electrical Power Conductors And Cables									
26-05-19.90 Wire									
Wire, copper, solid, 600 volt, #10, type THWN-THHN, in raceway	5.00 clf	101.74 /clf	509	48.88 /clf	244	-	150.62 /clf	753	
Wire			*509*		*244*			*753*	
Low-Voltage Electrical Power Conductors And Cables			*509*		*244*			*753*	
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
26-24-16.30 Panelboards Commercial Applications									
Labor	10.00 hr	127.17 /hr	1,272			-	127.17 /hr	1,272	
Panelboards Commercial Applications			*1,272*					*1,272*	
Panelboards			*1,272*					*1,272*	
E061A		***/ls***	***1,780***	***/ls***	***244***		***/ls***	***2,025***	
E062A									
26-05-26.00 Grounding And Bonding For Electrical Systems									
26-05-26.80 Grounding									
Bonding Jumper #6 wire Racks	1.00 ea	165.31 /ea	165	42.20 /ea	42	-	207.51 /ea	208	
Grounding			*165*		*42*			*208*	
Grounding And Bonding For Electrical Systems			*165*		*42*			*208*	
E062A		***/****	***165***	***/****	***42***		***/****	***208***	
E063A									
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									
Labor	3.00 hr	127.17 /hr	382			-	127.17 /hr	382	
Panelboards Commercial Applications			*382*					*382*	
Panelboards			*382*					*382*	
E063A			***382***					***382***	
E063B									
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									
Labor	2.00 hr	127.17 /hr	254			-	127.17 /hr	254	
Panelboards Commercial Applications			*254*					*254*	
Panelboards			*254*					*254*	
E063B		***/ls***	***254***	***/ls***			***/ls***	***254***	
E064A									
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									
Seal conduit	1.00 ea	254.32 /ea	254	42.20 /ea	42	-	296.52 /ea	297	
Panelboards Commercial Applications			*254*		*42*			*297*	
Panelboards			*254*		*42*			*297*	
E064A		***/****	***254***	***/****	***42***		***/****	***297***	
E065A									
26-05-19.00 Low-Voltage Electrical Power Conductors And Cables									
26-05-19.90 Wire									
Wire, color code branch circuit wires 10 circuits	10.00 ea	12.72 /ea	127	2.91 /ea	29	-	15.63 /ea	156	
Wire			*127*		*29*			*156*	
Low-Voltage Electrical Power Conductors And Cables			*127*		*29*			*156*	
E065A		***/****	***127***	***/****	***29***		***/****	***156***	
E066A									
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									
Provide typewritten panel schedules	10.00 ea	50.87 /ea	509	42.85 /ea	428	-	93.72 /ea	937	
Labor	20.00 hr	127.17 /hr	2,543			-	127.17 /hr	2,543	

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
Panelboards Commercial Applications			*3,052*		*428*			*3,481*	
Panelboards			*3,052*		*428*			*3,481*	
E066A		*/*****	*3,052*	*/*****	*428*		*/*****	*3,481*	
E066B									
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									
Provide typewritten panel schedules	8.00 ea	50.87 /ea	407	42.85 /ea	343	-	93.72 /ea	750	
Labor	16.00 hr	127.17 /hr	2,035			-	127.17 /hr	2,035	
Panelboards Commercial Applications			*2,442*		*343*			*2,784*	
Panelboards			*2,442*		*343*			*2,784*	
E066B			*2,442*		*343*			*2,784*	
E067B									
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									
Labor	1.00 hr	127.19 /hr	127			-	127.19 /hr	127	
Panelboards Commercial Applications			*127*					*127*	
Panelboards			*127*					*127*	
E067B			*127*					*127*	
E068									
26-05-19.00 Low-Voltage Electrical Power Conductors And Cables									
26-05-19.90 Wire									
Wire, copper, solid, 600 volt, #12, type THWN-THHN, in raceway	2.40 clf	92.48 /clf	222	31.00 /clf	74	-	123.49 /clf	296	
Wire			*222*		*74*			*296*	
Low-Voltage Electrical Power Conductors And Cables			*222*		*74*			*296*	
26-05-33.00 Raceway And Boxes For Electrical Systems									
26-05-33.05 Conduit									
Electric metallic tubing (EMT), 3/4" diameter, to 15' high, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	80.00 lf	7.83 /lf	626	2.80 /lf	224	-	10.63 /lf	850	
Conduit			*626*		*224*			*850*	
Raceway And Boxes For Electrical Systems			*626*		*224*			*850*	
26-27-26.00 Wiring Devices									
26-27-26.20 Wiring Devices Elements									
Duplex receptacle, grounded, 120 volt, 20 amp	4.00 ea	190.77 /ea	763	21.43 /ea	86	-	212.20 /ea	849	
Wiring Devices Elements			*763*		*86*			*849*	
Wiring Devices			*763*		*86*			*849*	
E068		*/*****	*1,611*	*/*****	*384*		*/*****	*1,995*	
E069									
26-28-16.00 Enclosed Switches And Circuit Breakers									
26-41-13.13 Lightning Protection For Buildings									
Lightning protection labor	1.00 ea	1,907.58 /ea	1,908	211.00 /ea	211	-	2,118.58 /ea	2,119	
Lightning protection cable, Class II Cable	700.00 lf	4.62 /lf	3,231	5.41 /lf	3,785	-	10.02 /lf	7,016	
Lightning Protection For Buildings			*5,139*		*3,996*			*9,135*	
Enclosed Switches And Circuit Breakers			*5,139*		*3,996*			*9,135*	

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
E069		/****	*5,139*	/****	*3,996*		/****	*9,135*	
E070									
26-05-26.00 Grounding And Bonding For Electrical Systems									
26-05-26.80 Grounding									
Bond items	7.00 ea	254.34 /ea	1,780	102.02 /ea	714	-	356.36 /ea	2,495	
Grounding			*1,780*		*714*			*2,495*	
Grounding And Bonding For Electrical Systems			*1,780*		*714*			*2,495*	
E070		/****	*1,780*	/****	*714*		/****	*2,495*	
E071									
26-05-26.00 Grounding And Bonding For Electrical Systems									
26-05-26.80 Grounding									
Bond items	8.00 ea	254.34 /ea	2,035	102.02 /ea	816	-	356.36 /ea	2,851	
Grounding			*2,035*		*816*			*2,851*	
Grounding And Bonding For Electrical Systems			*2,035*		*816*			*2,851*	
E071		/****	*2,035*	/****	*816*		/****	*2,851*	
E072									
26-28-16.00 Enclosed Switches And Circuit Breakers									
26-41-13.13 Lightning Protection For Buildings									
Air terminal 15' mounting pole	2.00 ea	165.32 /ea	331	137.15 /ea	274	-	302.47 /ea	605	
Lightning Protection For Buildings			*331*		*274*			*605*	
Enclosed Switches And Circuit Breakers			*331*		*274*			*605*	
E072		/****	*331*	/****	*274*		/****	*605*	
E073									
26-28-16.00 Enclosed Switches And Circuit Breakers									
26-41-13.13 Lightning Protection For Buildings									
Cable support fasteners	12.00 ea	63.59 /ea	763	7.39 /ea	89	-	70.97 /ea	852	
Lightning Protection For Buildings			*763*		*89*			*852*	
Enclosed Switches And Circuit Breakers			*763*		*89*			*852*	
E073		/****	*763*	/****	*89*		/****	*852*	
E074									
26-05-26.00 Grounding And Bonding For Electrical Systems									
26-05-26.80 Grounding									
Grounding SRGG	300.00 sf	2.54 /sf	763	11.08 /sf	3,323	-	13.62 /sf	4,086	
Grounding Labor	8.00 sf	127.18 /sf	1,017			-	127.18 /sf	1,017	
Grounding			*1,780*		*3,323*			*5,104*	
Grounding And Bonding For Electrical Systems			*1,780*		*3,323*			*5,104*	
E074		/****	*1,780*	/****	*3,323*		/****	*5,104*	
E075									
26-05-26.00 Grounding And Bonding For Electrical Systems									
26-05-26.80 Grounding									
Bonding Jumper #6 wire	18.00 ea	165.32 /ea	2,976	42.20 /ea	760	-	207.52 /ea	3,735	
Grounding			*2,976*		*760*			*3,735*	
Grounding And Bonding For Electrical Systems			*2,976*		*760*			*3,735*	
E075		/****	*2,976*	/****	*760*		/****	*3,735*	
E076									
26-05-19.00 Low-Voltage Electrical Power Conductors And Cables									

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
26-05-19.90 Wire									
Wire, copper, solid, 600 volt, #12, type THWN-THHN, in raceway	8.40 clf	92.49 /clf	777	31.00 /clf	260	-	123.49 /clf	1,037	
Wire			*777*		*260*			*1,037*	
Low-Voltage Electrical Power Conductors And Cables			*777*		*260*			*1,037*	
26-05-33.00 Raceway And Boxes For Electrical Systems									
26-05-33.05 Conduit									
Electric metallic tubing (EMT), 3/4" diameter, to 15' high, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	280.00 lf	7.83 /lf	2,191	2.80 /lf	785	-	10.63 /lf	2,976	
Conduit			*2,191*		*785*			*2,976*	
Raceway And Boxes For Electrical Systems			*2,191*		*785*			*2,976*	
26-28-16.00 Enclosed Switches And Circuit Breakers									
26-51-13.50 Interior Lighting Fixtures									
Lighting Labor	14.00 hr	127.17 /hr	1,780			-	127.17 /hr	1,780	
New T8 light fixtures	11.00 ea	178.04 /ea	1,958	272.19 /ea	2,994	-	450.23 /ea	4,953	
New CFL light fixtures	3.00 ea	178.05 /ea	534	257.42 /ea	772	-	435.47 /ea	1,306	
Interior Lighting Fixtures			*4,273*		*3,766*			*8,039*	
Enclosed Switches And Circuit Breakers			*4,273*		*3,766*			*8,039*	
E076		/****	*7,241*	/****	*4,811*		/****	*12,053*	
E077									
26-56-23.00 Area Lighting									
26-61-23.10 Lamps									
Fluorescent lamp, energy saver, 32 watt, 4' long, T8	26.00 ea	38.15 /ea	992	10.11 /ea	263	-	48.26 /ea	1,255	
Lamps			*992*		*263*			*1,255*	
Area Lighting			*992*		*263*			*1,255*	
E077		/****	*992*	/****	*263*		/****	*1,255*	
E078									
26-28-16.00 Enclosed Switches And Circuit Breakers									
26-51-13.50 Interior Lighting Fixtures									
Replace T12 Fixtures with New T8 light fixtures	30.00 ea	178.04 /ea	5,341	272.19 /ea	8,166	-	450.23 /ea	13,507	D
Lighting Labor	30.00 hr	127.17 /hr	3,815			-	127.17 /hr	3,815	
Interior Lighting Fixtures			*9,156*		*8,166*			*17,322*	
Enclosed Switches And Circuit Breakers			*9,156*		*8,166*			*17,322*	
E078		/****	*9,156*	/****	*8,166*		/****	*17,322*	
E079									
26-56-23.00 Area Lighting									
26-61-23.10 Lamps									
Fluorescent lamp, CFL	11.00 ea	12.72 /ea	140	35.26 /ea	388	-	47.98 /ea	528	
Lamps			*140*		*388*			*528*	
Area Lighting			*140*		*388*			*528*	
E079		/****	*140*	/****	*388*		/****	*528*	
E080									
26-28-16.00 Enclosed Switches And Circuit Breakers									
26-51-13.50 Interior Lighting Fixtures									
Lighting wire guards CFL	3.00 ea	76.30 /ea	229	36.93 /ea	111	-	113.23 /ea	340	

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
26-51-13.50 Interior Lighting Fixtures									
Lighting wire guards 1X4	4.00 ea	76.30 /ea	305	41.15 /ea	165	-	117.45 /ea	470	
Interior Lighting Fixtures			*534*		*275*			*809*	
Enclosed Switches And Circuit Breakers			*534*		*275*			*809*	
E080		*/*****	*534*	*/*****	*275*		*/*****	*809*	
E081									
26-05-19.00 Low-Voltage Electrical Power Conductors And Cables									
26-05-19.90 Wire									
Wire, copper, solid, 600 volt, #12, type THWN-THHN, in raceway	5.40 clf	92.49 /clf	499	31.00 /clf	167	-	123.49 /clf	667	
Wire			*499*		*167*			*667*	
Low-Voltage Electrical Power Conductors And Cables			*499*		*167*			*667*	
26-05-33.00 Raceway And Boxes For Electrical Systems									
26-05-33.05 Conduit									
Electric metallic tubing (EMT), 3/4" diameter, to 15' high, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	180.00 lf	7.83 /lf	1,409	2.80 /lf	504	-	10.63 /lf	1,913	
Conduit			*1,409*		*504*			*1,913*	
Raceway And Boxes For Electrical Systems			*1,409*		*504*			*1,913*	
26-28-16.00 Enclosed Switches And Circuit Breakers									
26-53-13.10 Exit Lighting Fixtures									
Exit lighting, L.E.D. standard, single face, ceiling or wall mount Replace existing	9.00 ea	203.47 /ea	1,831	285.65 /ea	2,571	-	489.12 /ea	4,402	
Exit Lighting Fixtures			*1,831*		*2,571*			*4,402*	
Enclosed Switches And Circuit Breakers			*1,831*		*2,571*			*4,402*	
E081		*/*****	*3,739*	*/*****	*3,243*		*/*****	*6,982*	
E082									
26-28-16.00 Enclosed Switches And Circuit Breakers									
26-51-13.50 Interior Lighting Fixtures									
Replace overhead lights with simmable overhead lights	12.00 ea	178.04 /ea	2,137	380.28 /ea	4,563	-	558.33 /ea	6,700	
Lighting Labor	12.00 hr	127.17 /hr	1,526			-	127.17 /hr	1,526	
Interior Lighting Fixtures			*3,663*		*4,563*			*8,226*	
Enclosed Switches And Circuit Breakers			*3,663*		*4,563*			*8,226*	
E082		*/*****	*3,663*	*/*****	*4,563*		*/*****	*8,226*	
05 Electrical		*/ls*	*102,948*	*/ls*	*131,009*		*/ls*	*233,956*	
02 BASE BUILDING		***/ls***	***629,849***	***/ls***	***859,278***	***15,628***	***/ls***	***1,655,627***	
05 E/G BUILDING									
01 Architectural									
A094									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	6.00 hr	72.48 /hr	435	-	-	-	72.48 /hr	435	
			435					*435*	

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
General Requirements		/ls	435	/ls			/ls	435	
070000.00 Thermal and Moisture Protection									
078413.10 Firestopping									
Firestopping, Wall Opening	12.00 ea	158.75 /ea	1,905	16.88 /ea	203	-	175.63 /ea	2,108	
Firestopping			1,905		203			2,108	
Thermal and Moisture Protection		/ls	1,905	/ls	203		/ls	2,108	
A094			2,340		203			2,542	
A095									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	8.34 hr	72.48 /hr	604	-	-	-	72.48 /hr	604	
			604					604	
General Requirements		/ls	604	/ls			/ls	604	
080000.00 Openings									
080505.10 Selective Demolition									
Remove Door Hardware	2.00 ea	169.67 /ea	339	-	-	-	169.67 /ea	339	
Selective Demolition			339					339	
087120.15 Hardware									
Average, door hardware set, Single Exterior, with Panic Device	2.00 door	476.26 /door	953	1,434.80 /door	2,870	-	1,911.06 /door	3,822	
Hardware			953		2,870			3,822	
Openings		/ls	1,292	/ls	2,870		/ls	4,161	
260000.00 Electrical									
260590.10 Residential Wiring									
Electrician, labor, disconnect & reconnect latch to security system & security card reader	2.00 ea	721.01 /ea	1,442	47.48 /ea	95	-	768.49 /ea	1,537	
Residential Wiring			1,442		95			1,537	
Electrical		/ls	1,442	/ls	95		/ls	1,537	
A095			3,338		2,965			6,303	
A096									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	6.47 hr	72.47 /hr	469	-	-	-	72.47 /hr	469	
			469					469	
General Requirements		/ls	469	/ls			/ls	469	
050000.00 Metals									
055133.13 Vertical Metal Ladders									
Expansion Bolt, 1/2" x 6", incl. layout & drill & fastner	18.00 ea	61.76 /ea	1,112	14.24 /ea	256	94	81.23 /ea	1,462	
Vertical Metal Ladders			1,112		256	94		1,462	
057323.50 Metal Railing									
Guard Rail 42" high,1 1/2" dia. galv., inc. horiz. rails @ 42" & 21', inc. vertical posts every 5'	20.00 lf	63.11 /lf	1,262	106.56 /lf	2,131		169.67 /lf	3,393	

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
Metal Railing			*1,262*		*2,131*			*3,393*	
Metals		*/ls*	*2,374*	*/ls*	*2,387*	*94*	*/ls*	*4,855*	
A096			*2,843*		*2,387*	*94*		*5,324*	
A097									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	36.32 hr	72.48 /hr	2,632	-	-	-	72.48 /hr	2,632	
			2,632					*2,632*	
General Requirements		*/ls*	*2,632*	*/ls*			*/ls*	*2,632*	
070000.00 Thermal and Moisture Protection									
079210.10 Caulking And Sealants									
Caulking & sealants, joint around door frames, int & ext	130.00 lf	25.82 /lf	3,357	1.88 /lf	244	-	27.70 /lf	3,601	
Caulking And Sealants			*3,357*		*244*			*3,601*	
Thermal and Moisture Protection		*/ls*	*3,357*	*/ls*	*244*		*/ls*	*3,601*	
080000.00 Openings									
080505.10 Selective Demolition									
Remove Door, Frame and Hardware	1.00 ea	237.48 /ea	237	11.25 /ea	11	-	248.73 /ea	249	D
Remove Door, Frame & Hardware, Double	2.00 ea	508.55 /ea	1,017	-	-	-	508.55 /ea	1,017	D
Selective Demolition			*1,255*		*11*			*1,266*	
081213.13 Standard Hollow Metal Frames									
Steel frs, knock dn, 16 ga., up to 5-3/4" D, 7'-0" hi, 3'-0" W, sgl	1.00 ea	238.15 /ea	238	334.55 /ea	335	-	572.70 /ea	573	D
Steel frs, knock dn, 14 ga., to 5-3/4" jamb d, 7'-0" hi, 5'-0" w, dbl	2.00 ea	198.45 /ea	397	368.01 /ea	736	-	566.46 /ea	1,133	D
Standard Hollow Metal Frames			*635*		*1,071*			*1,706*	
081313.13 Standard Hollow Metal Doors									
Coml st doors, insulated, 1-3/4" thk, full pnl, 18 Ga., 2'-6" x 7'-0"	4.00 ea	158.75 /ea	635	979.57 /ea	3,918	-	1,138.32 /ea	4,553	D
Coml st doors, insulated, 1-3/4" thk, full pnl, 18 Ga., 3'-0" x 7'-0"	1.00 ea	169.35 /ea	169	975.77 /ea	976	-	1,145.12 /ea	1,145	D
Standard Hollow Metal Doors			*804*		*4,894*			*5,698*	
087120.15 Hardware									
Average, door hardware set, Double	2.00 pr	476.26 /pr	953	1,160.50 /pr	2,321	-	1,636.76 /pr	3,274	
Auto-Lock, door latch hardware set, interior, U.L. Listed	1.00 door	476.26 /door	476	1,184.79 /door	1,185	-	1,661.05 /door	1,661	
Hardware			*1,429*		*3,506*			*4,935*	
087120.31 Door Closers									
Door Closer, surface mounted, heavy duty, fusible link arm	5.00 ea	238.13 /ea	1,191	518.54 /ea	2,593	-	756.67 /ea	3,783	
Door Closers			*1,191*		*2,593*			*3,783*	
087120.90 Hinges									
Hinges, full mortise, hi frequency, SS base, 4-1/2" x 4-1/2", us32	8.00 pr	-	-	269.77 /pr	2,158	-	269.77 /pr	2,158	

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
Hinges					*2,158*			*2,158*	
Openings		*/ls*	*5,313*	*/ls*	*14,233*		*/ls*	*19,546*	
090000.00 Finishes									
099123.35 Doors & Windows									
Prepare, Prime and Paint Wood or Metal Doors and Frames	220.00 sf	9.44 /sf	2,077	0.32 /sf	70	-	9.76 /sf	2,147	
Doors & Windows			*2,077*		*70*			*2,147*	
Finishes		*/ls*	*2,077*	*/ls*	*70*		*/ls*	*2,147*	
08-00-00.00 OPENINGS									
08-12-13.13 Standard Hollow Metal Frames									
Steel frames, add for galvanizing	3.00 ea	-	-	63.61 /ea	191	-	63.61 /ea	191	
Standard Hollow Metal Frames					*191*			*191*	
OPENINGS		*/ls*		*/ls*	*191*		*/ls*	*191*	
A097			*13,380*		*14,737*			*28,116*	
A098									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	5.40 hr	72.48 /hr	391	-	-	-	72.48 /hr	391	
			391					*391*	
General Requirements		*/ls*	*391*	*/ls*			*/ls*	*391*	
070000.00 Thermal and Moisture Protection									
079210.10 Caulking And Sealants									
Remove & Replace damaged Sealants	150.00 lf	11.15 /lf	1,673	2.53 /lf	380	430	16.55 /lf	2,483	
Caulking And Sealants			*1,673*		*380*	*430*		*2,483*	
Thermal and Moisture Protection		*/ls*	*1,673*	*/ls*	*380*	*430*	*/ls*	*2,483*	
A098			*2,064*		*380*	*430*		*2,875*	
01 Architectural		*/ls*	*23,965*	*/ls*	*20,671*	*524*	*/ls*	*45,161*	
05 Electrical									
E083A									
26-05-19.00 Low-Voltage Electrical Power Conductors And Cables									
26-05-19.90 Wire									
Wire, copper, solid, 600 volt, #10, type THWN-THHN, in raceway	0.15 clf	101.73 /clf	15	48.73 /clf	7	-	150.47 /clf	23	
Wire			*15*		*7*			*23*	
Low-Voltage Electrical Power Conductors And Cables			*15*		*7*			*23*	
26-05-33.00 Raceway And Boxes For Electrical Systems									
26-05-33.05 Conduit									
Rigid galvanized steel conduit, 3/4" diameter, to 15' H, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	10.00 lf	12.72 /lf	127	7.75 /lf	77	-	20.47 /lf	205	
Conduit			*127*		*77*			*205*	
Raceway And Boxes For Electrical Systems			*127*		*77*			*205*	
26-24-16.00 Panelboards									
26-24-16.20 Panelboard And Load Center Circuit Breakers									

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
26-24-16.20 Panelboard And Load Center Circuit Breakers									
Circuit breakers, bolt-on, 10 k A I.C., 3 pole, 240 volt, 15 to 60 amp	1.00 ea	164.09 /ea	164	257.51 /ea	258	-	421.60 /ea	422	
Panelboard And Load Center Circuit Breakers			*164*		*258*			*422*	
26-24-16.30 Panelboards Commercial Applications									
Labor	2.00 hr	127.17 /hr	254			-	127.17 /hr	254	
Panelboards Commercial Applications			*254*					*254*	
Panelboards			*418*		*258*			*676*	
26-28-16.00 Enclosed Switches And Circuit Breakers									
26-35-26.40 Transient Voltage Suppressor Transformer									
Transient voltage suppressor for panels	1.00 ea	381.50 /ea	382	2,142.41 /ea	2,142	-	2,523.91 /ea	2,524	
Transient Voltage Suppressor Transformer			*382*		*2,142*			*2,524*	
Enclosed Switches And Circuit Breakers			*382*		*2,142*			*2,524*	
E083A		***/****	***942***	***/****	***2,485***		***/****	***3,427***	
E084A									
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									
Labor to remove circuits	3.00 hr	127.17 /hr	382			-	127.17 /hr	382	
Panelboards Commercial Applications			*382*					*382*	
Panelboards			*382*					*382*	
E084A		***/****	***382***	***/****			***/****	***382***	
E085A									
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									
Labor to remove circuits	3.00 hr	127.17 /hr	382			-	127.17 /hr	382	
Panelboards Commercial Applications			*382*					*382*	
Panelboards			*382*					*382*	
E085A		***/****	***382***	***/****			***/****	***382***	
E086A									
26-05-19.00 Low-Voltage Electrical Power Conductors And Cables									
26-05-19.90 Wire									
Wire, copper, solid, 600 volt, #10, type THWN-THHN, in raceway	1.50 clf	101.73 /clf	153	48.89 /clf	73	-	150.62 /clf	226	
Wire			*153*		*73*			*226*	
Low-Voltage Electrical Power Conductors And Cables			*153*		*73*			*226*	
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									
Labor	3.00 hr	127.17 /hr	382			-	127.17 /hr	382	
Panelboards Commercial Applications			*382*					*382*	
Panelboards			*382*					*382*	
E086A			***534***		***73***			***607***	
E087A									
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									
Labor	1.00 hr	127.17 /hr	127			-	127.17 /hr	127	

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
Panelboards Commercial Applications			*127*					*127*	
Panelboards			*127*					*127*	
E087A			*127*					*127*	
E088A									
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									
Panelboards, add new door in door and remove existing door	3.00 ea	63.59 /ea	191	846.76 /ea	2,540	-	910.35 /ea	2,731	
Panelboards Commercial Applications			*191*		*2,540*			*2,731*	
Panelboards			*191*		*2,540*			*2,731*	
E088A			*191*		*2,540*			*2,731*	
E089A									
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									
Knock out Covers	1.00 ea	63.57 /ea	64	2.93 /ea	3	-	66.50 /ea	67	
Panelboards Commercial Applications			*64*		*3*			*67*	
Panelboards			*64*		*3*			*67*	
E089A			*64*		*3*			*67*	
E090A									
26-05-19.00 Low-Voltage Electrical Power Conductors And Cables									
26-05-19.90 Wire									
Wire, copper, solid, 600 volt, #10, type THWN-THHN, in raceway	5.00 clf	101.74 /clf	509	48.88 /clf	244	-	150.61 /clf	753	
Wire			*509*		*244*			*753*	
Low-Voltage Electrical Power Conductors And Cables			*509*		*244*			*753*	
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									
Labor	10.00 hr	127.17 /hr	1,272			-	127.17 /hr	1,272	
Panelboards Commercial Applications			*1,272*					*1,272*	
Panelboards			*1,272*					*1,272*	
E090A			*1,780*		*244*			*2,025*	
E091A									
26-05-19.00 Low-Voltage Electrical Power Conductors And Cables									
26-05-19.90 Wire									
Wire, copper, solid, 600 volt, #10, type THWN-THHN, in raceway	5.00 clf	101.74 /clf	509	48.88 /clf	244	-	150.62 /clf	753	
Wire			*509*		*244*			*753*	
Low-Voltage Electrical Power Conductors And Cables			*509*		*244*			*753*	
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									
Labor	10.00 hr	127.17 /hr	1,272			-	127.17 /hr	1,272	
Panelboards Commercial Applications			*1,272*					*1,272*	
Panelboards			*1,272*					*1,272*	
E091A			*1,780*		*244*			*2,025*	
E092A									
26-05-33.00 Raceway And Boxes For Electrical Systems									

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
26-05-33.25 Conduit Fittings For Rigid Galvanized Steel									
Conduit fittings for rigid galvanized steel, grounding bushing, insulated, 3/4" diameter	1.00 ea	36.35 /ea	36	11.46 /ea	11	-	47.81 /ea	48	
Conduit Fittings For Rigid Galvanized Steel			*36*		*11*			*48*	
Raceway And Boxes For Electrical Systems			*36*		*11*			*48*	
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									
Labor	1.00 hr	127.17 /hr	127			-	127.17 /hr	127	
Panelboards Commercial Applications			*127*					*127*	
Panelboards			*127*					*127*	
E092A			*164*		*11*			*175*	
E093A									
26-24-16.00 Panelboards									
26-24-16.30 Panelboards Commercial Applications									
Provide typewritten panel schedules	1.00 ea	50.86 /ea	51	42.87 /ea	43	-	93.73 /ea	94	
Labor	2.00 hr	127.18 /hr	254			-	127.18 /hr	254	
Panelboards Commercial Applications			*305*		*43*			*348*	
Panelboards			*305*		*43*			*348*	
E093A			*305*		*43*			*348*	
E094									
26-28-16.00 Enclosed Switches And Circuit Breakers									
26-41-13.13 Lightning Protection For Buildings									
Lightning protection labor	1.00 ea	1,907.59 /ea	1,908	211.00 /ea	211	-	2,118.59 /ea	2,119	
Lightning protection cable, Class II Cable	200.00 lf	4.62 /lf	923	5.41 /lf	1,081	-	10.02 /lf	2,005	
Lightning Protection For Buildings			*2,831*		*1,292*			*4,123*	
Enclosed Switches And Circuit Breakers			*2,831*		*1,292*			*4,123*	
E094			*2,831*		*1,292*			*4,123*	
E095									
26-05-26.00 Grounding And Bonding For Electrical Systems									
26-05-26.80 Grounding									
Bond items	1.00 ea	254.37 /ea	254	102.00 /ea	102	-	356.37 /ea	356	
Grounding			*254*		*102*			*356*	
Grounding And Bonding For Electrical Systems			*254*		*102*			*356*	
E095			*254*		*102*			*356*	
E096									
26-05-26.00 Grounding And Bonding For Electrical Systems									
26-05-26.80 Grounding									
Bond items	6.00 ea	254.35 /ea	1,526	102.02 /ea	612	-	356.36 /ea	2,138	
Grounding			*1,526*		*612*			*2,138*	
Grounding And Bonding For Electrical Systems			*1,526*		*612*			*2,138*	
E096			*1,526*		*612*			*2,138*	
E097									
26-28-16.00 Enclosed Switches And Circuit Breakers									
26-41-13.13 Lightning Protection For Buildings									
Cable support fasteners	6.00 ea	63.59 /ea	382	7.39 /ea	44	-	70.97 /ea	426	

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
Lightning Protection For Buildings			*382*		*44*			*426*	
Enclosed Switches And Circuit Breakers			*382*		*44*			*426*	
E097			*382*		*44*			*426*	
E098									
26-05-19.00 Low-Voltage Electrical Power Conductors And Cables									
26-05-19.90 Wire									
Wire, copper, solid, 600 volt, #12, type THWN-THHN, in raceway	9.00 clf	92.49 /clf	832	31.00 /clf	279	-	123.49 /clf	1,111	
Wire			*832*		*279*			*1,111*	
Low-Voltage Electrical Power Conductors And Cables			*832*		*279*			*1,111*	
26-05-33.00 Raceway And Boxes For Electrical Systems									
26-05-33.05 Conduit									
Electric metallic tubing (EMT), 3/4" diameter, to 15' high, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	300.00 lf	7.83 /lf	2,348	2.80 /lf	841	-	10.63 /lf	3,188	
Conduit			*2,348*		*841*			*3,188*	
Raceway And Boxes For Electrical Systems			*2,348*		*841*			*3,188*	
26-28-16.00 Enclosed Switches And Circuit Breakers									
26-51-13.50 Interior Lighting Fixtures									
Lighting Labor	15.00 hr	127.17 /hr	1,908			-	127.17 /hr	1,908	
New T8 light fixtures	15.00 ea	178.04 /ea	2,671	272.19 /ea	4,083	-	450.23 /ea	6,753	D
Interior Lighting Fixtures			*4,578*		*4,083*			*8,661*	
Enclosed Switches And Circuit Breakers			*4,578*		*4,083*			*8,661*	
E098			*7,758*		*5,203*			*12,961*	
E099									
26-05-19.00 Low-Voltage Electrical Power Conductors And Cables									
26-05-19.90 Wire									
Wire, copper, solid, 600 volt, #12, type THWN-THHN, in raceway	1.80 clf	92.48 /clf	166	31.01 /clf	56	-	123.49 /clf	222	
Wire			*166*		*56*			*222*	
Low-Voltage Electrical Power Conductors And Cables			*166*		*56*			*222*	
26-05-33.00 Raceway And Boxes For Electrical Systems									
26-05-33.05 Conduit									
Electric metallic tubing (EMT), 3/4" diameter, to 15' high, incl 2 terminations, 2 elbows & 11 beam clamps per 100 LF	60.00 lf	7.83 /lf	470	2.80 /lf	168	-	10.63 /lf	638	
Conduit			*470*		*168*			*638*	
Raceway And Boxes For Electrical Systems			*470*		*168*			*638*	
26-28-16.00 Enclosed Switches And Circuit Breakers									
26-53-13.10 Exit Lighting Fixtures									
Exit lighting, L.E.D. standard, single face, ceiling or wall mount Replace existing	3.00 ea	203.48 /ea	610	285.64 /ea	857	-	489.12 /ea	1,467	
Exit Lighting Fixtures			*610*		*857*			*1,467*	
Enclosed Switches And Circuit Breakers			*610*		*857*			*1,467*	
E099			*1,246*		*1,081*			*2,327*	

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
05 Electrical		*/ls*	*20,648*	*/ls*	*13,979*		*/ls*	*34,627*	
05 E/G BUILDING		***/ls***	***44,613***	***/ls***	***34,650***	***524***	***/ls***	***79,787***	
07 SITE IMPROVEMENTS									
01 Architectural									
A099									
010000.00 General Requirements									
013113.20									
Field personnel, misc labor, cleanup	287.05 hr	72.48 /hr	20,805	-	-	-	72.48 /hr	20,805	
			20,805					*20,805*	
General Requirements		*/ls*	*20,805*	*/ls*			*/ls*	*20,805*	
100000.00 Specialties									
101453.20 Traffic Signs									
Handicap Parking Sign	3.00 ea	107.03 /ea	321	242.65 /ea	728		349.68 /ea	1,049	
Signs, add for steel post, galvanized 10'-0" high	3.00 ea	22.66 /ea	68	46.73 /ea	140	26	78.20 /ea	235	
Traffic Signs			*389*		*868*	*26*		*1,284*	
Specialties		*/ls*	*389*	*/ls*	*868*	*26*	*/ls*	*1,284*	
320000.00 Exterior Improvements									
321216.14 Asphaltic Concrete Pavement,									
Resurface Exterior Paving	2,611.11 sy	28.39 /sy	74,126	6.33 /sy	16,528	5,780	36.93 /sy	96,434	D
Asphaltic Concrete Pavement,			*74,126*		*16,528*	*5,780*		*96,434*	
321723.13 Painted Pavement Markings									
Paint Access Aisle between HC Stalls, 20' x 5'	300.00 sf	4.94 /sf	1,482	1.46 /sf	437	97	6.72 /sf	2,016	
Paint "No Parking" area	1,420.00 sf	4.94 /sf	7,013	1.46 /sf	2,067	460	6.72 /sf	9,541	
Paint Striped Parking Lines	61.00 ea	74.82 /ea	4,564	24.48 /ea	1,493	-	99.30 /ea	6,057	
Paint HC Symbol on pvmt	3.00 ea	87.33 /ea	262	12.66 /ea	38	-	99.99 /ea	300	
Painted Pavement Markings			*13,321*		*4,035*	*558*		*17,913*	
Exterior Improvements		*/ls*	*87,446*	*/ls*	*20,563*	*6,338*	*/ls*	*114,348*	
A099			***108,640***		***21,432***	***6,364***		***136,436***	
01 Architectural		*/ls*	*108,640*	*/ls*	*21,432*	*6,364*	*/ls*	*136,436*	
05 Electrical									
E100									
26-28-16.00 Enclosed Switches And Circuit Breakers									
26-56-19.20 Roadway Luminaire									
Retrofit pole light with LED Lights	4.00 ea	763.04 /ea	3,052	527.50 /ea	2,110	-	1,290.54 /ea	5,162	D
Roadway Luminaire			*3,052*		*2,110*			*5,162*	
Enclosed Switches And Circuit Breakers			*3,052*		*2,110*			*5,162*	
26-56-23.00 Area Lighting									
26-56-23.10 Exterior Fixtures									
Replace existing wall pack with new LED wall pack	1.00 ea	508.68 /ea	509	759.60 /ea	760	-	1,268.28 /ea	1,268	D
Replace existing wall fixture with new LED globe fixtures	5.00 ea	508.68 /ea	2,543	812.35 /ea	4,062	-	1,321.03 /ea	6,605	D
Exterior Fixtures			*3,052*		*4,821*			*7,873*	
Area Lighting			*3,052*		*4,821*			*7,873*	

Spreadsheet Level	Takeoff Quantity	Labor Cost/Unit	Labor Amount	Material Cost/Unit	Material Amount	Equip Amount	Total Cost/Unit	Total Amount	Duplicate "D"
E100			*6,104*		*6,931*			*13,036*	
E101									
26-56-23.00 Area Lighting									
26-56-23.55 Exterior LED Fixtures									
Photocell	3.00 ea	254.35 /ea	763	232.10 /ea	696	-	486.45 /ea	1,459	
Exterior LED Fixtures			*763*		*696*			*1,459*	
Area Lighting			*763*		*696*			*1,459*	
E101			*763*		*696*			*1,459*	
E103									
26-56-23.00 Area Lighting									
26-56-23.10 Exterior Fixtures									
Replace existing incan fixture with new LED light fixture	1.00 ea	508.68 /ea	509	791.25 /ea	791	-	1,299.93 /ea	1,300	
Exterior Fixtures			*509*		*791*			*1,300*	
Area Lighting			*509*		*791*			*1,300*	
E103			*509*		*791*			*1,300*	
E104									
26-56-23.00 Area Lighting									
26-56-23.10 Exterior Fixtures									
Replace existing incan obstruction lights with new LED type	4.00 ea	508.69 /ea	2,035	949.50 /ea	3,798	-	1,458.19 /ea	5,833	D
Exterior Fixtures			*2,035*		*3,798*			*5,833*	
26-56-23.55 Exterior LED Fixtures									
Photocell	1.00 ea	254.34 /ea	254	232.10 /ea	232	-	486.44 /ea	486	
Exterior LED Fixtures			*254*		*232*			*486*	
Area Lighting			*2,289*		*4,030*			*6,319*	
E104			*2,289*		*4,030*			*6,319*	
05 Electrical		*/ls*	*9,665*	*/ls*	*12,449*		*/ls*	*22,114*	
07 SITE IMPROVEMENTS		***/ls***	***118,305***	***/ls***	***33,881***	***6,364***	***/ls***	***158,550***	

Estimate Totals

Description	Amount	Totals	Hours	Rate	Cost Basis	Cost per Unit	Percent of Total	
Labor	1,698,832		####### hrs				45.25%	
Material	1,854,710						49.40%	
Subcontract	2,394						0.06%	
Equipment	48,824		545.043 hrs				1.30%	
Other	149,365						3.98%	
	3,754,125	**3,754,125**					**100.00%**	#####
Total		***3,754,125***						

APPENDIX F: CONDITION ASSESSMENT MECHANICAL AND ELECTRICAL EQUIPMENT LIST

Site ID: TUL ATCT and Base Building - Tulsa, OK					
Division	**Equipment***	**Location**	**Manufacturer**	**Model**	**Year**
Mechanical	**ATCT**				
ATCT Heating Water System					
1	B-T1 & B-T2: Natural gas-fired boilers - 750 MBH input - 630 MBH output	Mechanical Equipment Room B04	Raypak	H3-0752B	2016
2	P-T1: Heating water pump - 1-1/2 HP - 90 GPM	Mechanical Equipment Room B04	Bell & Gossett	2A6.125 BF	1997
3	P-T2 & P-T3: Heating water pumps - 3/4 HP	Mechanical Equipment Room B04	Taco	1614C3N2	2000
4	DF-1: Draft inducing flue fan - approximately 1,500 cfm - 1 HP (interlocked with the boilers)	Exterior - top of boiler flue	Exhausto	RSV 315	2016
4	BBT-1: Heating water buffer tank - 120 gallon	Storage Room B03	Boiler Buddy	BBT120	2019
5	P-T4: Heating water pump - 1-1/2 HP, 110 GPM	Storage Room B03	Bell & Gossett	2x8.25	2019
6	ET-T1: Expansion tank - 21.7 gallon - (serves heating water system)	Mechanical Equipment Room B04	Bell & Gossett	D40	1997
7	ET-T2: Expansion tank - 80 gallon - (serves heating water system)	Mechanical Equipment Room B05	Bell & Gossett	Not Visible	1997
8	ET-T3: Expansion tank - 62 gallon (serves heating water system)	Electronic Equipment Room 705	Bell & Gossett	Not Visible	1997
9	CPF-2: Chemical pot feeder - approximately 2 gallon	Mechanical Equipment Room B04	Garratt-Callahan	Not Visible	1997
ATCT Chilled Water System					
10	TCH-1: Air-cooled water chiller - scroll compressors - 30 Ton	Grade east of ATCT	Trane	CGAM030A202	2016
11	P-T1C: Chilled water pump - 5 HP	Mechanical Equipment Room B04	Bell & Gossett	NA	1997
Cab Roof					
12	EF-T1: Emergency exhaust fan - 1 HP (controlled by wall-mounted switch)	Cab roof	Jenair	244 CK E	1958
Cab					
13	CLF-1: Residential type ceiling fan (controlled by pull-chains)	Cab	Not Visible	Not Visible	2004

Site ID: TUL ATCT and Base Building - Tulsa, OK					
Division	**Equipment***	**Location**	**Manufacturer**	**Model**	**Year**
Mechanical - continued	**ATCT - continued**				
Junction Level (Tenth Floor) and Catwalk					
14	TAHU-1 & TAHU-2: Air handling units - 1,555 CFM - 1/3 HP - 36 MBH DX cooling (serve Cab) (controlled by thermostat in Cab)	Junction Room J02	Goodman	ARUF37C14AA	2016
15	TCU-1 & TCU-2: Air-cooled condensers - 36 MBH (serves TAHU-1 and TAHU-2)	Catwalk	Goodman	VSX140361AB	2016
Ninth Floor					
16	AC-1: Window-type air conditioning unit - 17.5 MBH cooling - 9.8 MBH heating (controlled by integrated thermostat)	Break Room 903	LG	LW1814HR	2014
17	EF-T2: Exhaust fan - approximately 95 CFM (controlled by motion switch)	Unisex Restroom 902	Broan	Not Visible	2014
Eighth Floor					
18	AC-2: Window-type air conditioning unit - 24.7 MBH cooling - 13 MBH heating (controlled by integrated thermostat)	Electronic Equipment Room 802	Frigidaire	FFRH2522R2	2017
Seventh Floor					
19	AHU-T1: Air handling unit, multizone (serves Seventh thru Ninth Floors and Cab) - chilled water and hot water - approximately 6,000 Cfm - 15 HP	Mechanical Equipment Room 702	Trane	MCC012	1997
20	AC-3: Window-type air conditioning unit - approximately 24 MBH cooling (controlled by unit mounted push buttons)	Electronic Equipment Room 705	Carrier	Not Visible	1987
Basement					
21	AHU-T2: Air handling unit - chilled water - 2 HP, upright (serves the Link) (capacity is unknown) (controlled by pneumatic thermostat in ATCT Stair)	Mechanical Equipment Room B04	Trane Climate Changer	3	1958
22	AHU-T3: Air handling unit - chilled water - 1 HP, horizontal (serves the Elevator Machine Room) (capacity is unknown) (controlled by pneumatic	Mechanical Equipment Room B04	Trane Torrivent	T7	1958
23	AC-2: Air compressor - 1-1/2 HP (serves pneumatic controls in ATCT)	Mechanical Equipment Room B04	DeVilbis	UPJ5252-1	1958
24	AD-2: Air dryer - 10 SCFM at 100 PSIG & 100° F (serves AC-2)	Mechanical Equipment Room B04	Speedaire	3YA49A	2010

Site ID: TUL ATCT and Base Building - Tulsa, OK					
Division	**Equipment***	**Location**	**Manufacturer**	**Model**	**Year**
Mechanical - continued	**Base Building**				
Base Building Heating Water System					
1	B-1: Natural gas-fired boiler - 511.5 MBH input - 419.4 MBH output	Mechanical Equipment Room 121	Raypack	H1-0514C	2016
2	P-1 & P-2: Hot water pumps - 3/4 HP	Mechanical Equipment Room 121	Bell & Gossett	Not Visible	2014
3	CPF-1: Chemical pot feeder - approximately 2 gallon	Mechanical Equipment Room 121	Garratt-Callahan	Not Visible	1997
4	ET-1: Expansion tank - 30 gallon	Mechanical Equipment Room 121	Bell & Gossett	Not Visible	1997
5	SF-2: Supply air fan - propeller type - (interlocked with boiler)	Mechanical Equipment Room 121	Not Visible	Not Visible	2016
Air Distribution Equipment					
6	AHU-5: Air handling unit, multizone (serves Orignal Base Building, including Electronics Equipment Room 124) - approximately 11,000 CFM - 7.5 HP - 240 MBH DX cooling - hot water heating	Mechanical Equipment Room 121	Trane	MCCA012	1997
7	CU-5: Air-cooled condensing unit - 240 MBH (serves AHU-5)	Exterior west of Base Building	Trane	TTA240H300AA	2017
8	AHU-4: Air handling unit (serves north offices and above ceiling supply in TRACON Room) - 3,800 CFM - 3 HP - 120 MBH DX cooling	Mechanical Equipment Room 129	Westinghouse	AHV 110LF	1972
9	CU-4: Air-cooled condensing unit - 120 MBH (serves AHU-4)	Roof	Trane	Not Visible	2017
10	RC-1 thru RC-8: Reheat boxes with hot water reheat coils for AHU-4	Various locations in ductwork	Metalaire	Not Visible	1972
11	CRU-1 & CRU-2: Computer room type air conditioning units (serve TRACON Room) - 9,400 CFM - 5 HP - 178 MBH DX cooling - 25 KW heating - 17.4 Lbs humidifier (controlled by thermostat via and auto-changeover controller)	Mechanical Equipment Room 130 (for CRU-1) and Corridor 104 (for CRU-2)	Liebert	DH199A-AAEI	2004
12	ACC-1 & ACC-2: Air-cooled condensing units (serve CRU-1 & CRU-2, respectively)	Roof	Liebert	DCDF205-A	2004

Site ID: TUL ATCT and Base Building - Tulsa, OK					
Division	**Equipment***	**Location**	**Manufacturer**	**Model**	**Year**
Mechanical - continued	**Base Building - continued**				
Air Distribution Equipment - continued					
13	CRU-3 & CRU-4: Computer room type air conditioning units - 12,000 CFM - 7.5 HP - 228 MBH DX cooling - 30 KW heating - 22.1 Lbs humidifier (controlled by thermostats via and auto-changeover controller)	Electronics Equipment Room 124	Liebert	DH245A-AAEI	2004
14	ACC-3 & ACC-4: Air-cooled condensing units (serves CRU-3 & CRU-4, respectively)	Roof	Liebert	DCDF308-A	2004
15	AHU-1 & AHU-2: Air handling units - 1,200 CFM - 1/2 HP - 36 MBH DX cooling - 7.2 KW heating (controlled by wall-mounted thermostat via the DDC system)	Telco Room 140	Trane	TWE36C14FB0	2004
16	CU-1 & CU-2: Air-cooled condensing units - 36 MBH (serves AHU-1 & AHU-2, respectively)	Exterior to south of the Base Building	Trane	2TT2036A4000AB	2004
17	CLF-2 & CLF-3: Residential type ceiling fans (controlled by pull-chains)	TRACON Room 132	Not Visible	Not Visible	2004
18	EF-1: Exhaust fan - 400 CFM - 1/8 HP (controlled by wall-mounted timer)	Smoking Room 145	Cook	120 SP	2004
19	EF-2: Exhaust fan - 490 CFM - 1/4 HP (serves Restrooms 120 and 137)	Roof	Cook	141BCR	1972
20	EF-3: Exhaust fan - 250 CFM - 1/8 HP (serves Unisex Restroom 122)	Roof	Cook	Not Visible	1958
21	AC-1: Air compressor - 3/4 HP (serves Base Building pneumatic controls)	Mechanical Equipment Room 121	Powers	Not Visible	1988
22	AD-1: Air Dryer (serves AC-1)	Mechanical Equipment Room 121	Johnson Controls	Not Visible	1988
Engine Generator (E/G) Building					
1	AHU-3: Air handling unit - 3,000 CFM - 1.5 HP - 90 MBH DX cooling (controlled by wall-mounted thermostat)	UPS Room U02	Trane	TWE090A300EL	2004
2	CU-3: Air-cooled condensing unit - 90 MBH (serves AHU-3)	Exterior east of E/G Building	Trane	TTA090A400FA	2004
3	RTU-1: Rooftop air conditioning unit (Serves UPS Room U02 (along with AHU-3)) - 90 MBH DX cooling (controlled by wall-mounted thermostat)	Roof	Lennox	KCA090S4BN1Y	2010

Site ID: TUL ATCT and Base Building - Tulsa, OK					
Division	**Equipment***	**Location**	**Manufacturer**	**Model**	**Year**
Mechanical - continued	**E/G Building - continued**				
4	TF-1: Transfer fan - dual propeller fans (transfers are from UPS Room to Battery Room) - 465 CFM (controlled by wall-mounted variable speed controller)	Battery Room U03	Greenheck	CBF-205-QD	2005
5	EF-2: Exhaust fan - propeller type - 1,380 CFM - 1/3 HP (interlocked with engine generator)	Engine Generator Room U01	Cook	180 SP 18SP10D	2004
6	EUH-1: Electric unit heater - 3 KW (controlled by wall-mounted thermostat)	Battery Room U03	Marley	MUH-03-8	1988
7	EUH-2: Electric unit heater - 3 KW (controlled by wall-mounted thermostat)	Engine Generator Room U01	Marley	MUH-03-8	1988
8	FT-1: Above ground fuel storage tank - 1,500 Gallon	Exterior north of E/G Building	Highland Tank	Fireguard	2018
9	DT-1: Day tank - 60 Gal	Engine Generator Room U01	Kohler	GM19899	2004
10	FLM-1: Fuel level monitoring panel	Engine Generator Room U01	Veeder-Root	TLS-300C	2019
Plumbing	**ATCT**				
Cab					
1	EWH-T1: Electric water heater - approximately 5 gallon (assumed abandoned)	Cab	Not Visible	Not Visible	2004
2	EWH-T3: Electric water heater (instantaneous) - 0.026 gallon - 2.4 kW	Cab	Stiebel Eltron	MINI 2.5-1	2018
3	EWC-T1: Remote water cooler - 2.1 gallon	Cab	Elkay	ERSI	2004
Junction Level (Tenth Floor)					
4	CV-T1: Central vacuum cleaner (serves Cab) - 112 SCFM	Junction Room J02	Hoover	S5610	2004
Ninth Floor					
5	EWC-T2: Electric water cooler	ATCT Stair 901	Halsay-Taylor	SW4AQ-1J	1997
6	D-3: Garbage disposal - 1/2 HP	Break Room 903	GE	GFC530F-00	2004
Seventh Floor					
7	EWH-T2: Electric water heater (serves Ninth Floor sinks) - 6 gallon - 2 kW	Mechanical Equipment Room 702	Rheem	81VP6S	1997

Site ID: TUL ATCT and Base Building - Tulsa, OK					
Division	**Equipment***	**Location**	**Manufacturer**	**Model**	**Year**
Plumbing - continued	**ATCT - continued**				
	Basement				
8	SP-1 & SP-2: Sump pumps - 1/3 HP	Mechanical Equipment Room B04	Dayton	4KU60	2015
	Base Building				
1	EWC-1: Electric water cooler	Corridor 103	Elkay	Not Visible	1989
2	WH-1: Gas-fired water heater - 40 MBH input - 28 gallon - 40.94 gal/hr recovery rate	Mechanical Equipment Room 129	State	GS630YBRT	2005
3	P-3: Domestic hot water circulating pump 1/12 HP	Mechanical Equipment Room 129	B & G	Series 100 BNFI	2018
4	WH-2: Natural gas-fired water heater - 35.5 MBH input - 30 gallon - 37.29 gal/hr recovery rate	Mechanical Equipment Room 121	A.O Smith	GCR-60 400	2017
5	DG-1: Drain pump - 4.8 gallon - 1/3 HP	Tech Ops Ready Room	Zoller	105	2004
6	D-1: Garbage disposal - 1/2 HP	Tech Ops Ready Room	GE	GFC530F-00	2004
7	D-2: Garbage disposal - 1/2 HP	Kitchen 117	GE	GFC530F-00	2004
Fire and Life Safety	**ATCT**				
	Cab				
1	FAAP-1: Fire alarm annunciator panel	Cab	Notifier	Not Visible	2012
	Ninth Floor				
2	KFS-1: Kitchen fire suppression system	Break Room 903	Guardian III	G300-A	2012
	Second Floor				
3	SF-1: Stairwell pressurization fan - 17,500 CFM - 5 HP	Second Floor ATCT Stair	Greenheck	Not Visible	1996
	First Floor				
4	FACP-1: Fire alarm control panel	ATCT Stair 101	Notifier	Not Visible	2012
	Base Building				
1	FAAP-2: Fire alarm annunciator panel	TRACON Room 132	Notifier	Not Visible	2012

Site ID: TUL ATCT and Base Building - Tulsa, OK					
Division	**Equipment**	**Location**	**Manufacturer**	**Model**	**Year**
Electrical	**E/G Building**				
1	Main Building Service Distribution Switchboard MDPNH (Airport-owned) - 800 A MCB	Engine Generator Room U01	Square D	QED S	2004
2	Main Essential Distribution Panelboard MDPEH Section 1 - 600 A MCB	Battery Room U03	Square D	I-Line HCP	2004
3	Main Essential Distribution Panelboard MDPEH Section 2 - 600 A MCB	Battery Room U03	Square D	I-Line HCP	2004
4	Panelboard MDPE (UPS Panel Essential) - 800 A MLO	UPS Room U02	Square D	I-Line HCW	1988
5	Panelboard MDPC (UPS Panel Critical) - 800 A MLO	UPS Room U02	Square D	I-Line HCW	1988
6	Panelboard LPY - 100 A MCB	Engine Generator Room U01	Square D	NQOD	1988
7	Panelboard UPS1 - 400 A MLO	UPS Room U02	Square D	I-Line HCP	2002
8	E/G - 375 kVA/300 kW	Engine Generator Room U01	Kohler	350REOZD	2004
9	ATS - 600 A	Engine Generator Room U01	Kohler	350REOZD	2004
10	UPS - 100 kVA	UPS Room U02	Mitsubishi	9700 Series	2002
11	UPS Maintenance Bypass Panel - 400 A	UPS Room U02	Kinney	WB233	2002
12	UPS Load Bank - 200 kW	E/G Building Roof	Avtron	K675 D16308	2002
Base Building					
1	Switchboard MDPN (Airport-owned) - 1200 A MCB	Open Courtyard 139	Siemens	CDP-6	1989
2	Panelboard CAB5 (Feed from MCI UPS) - 125 A MLO	Corridor 141	Siemens	G1224ML3125LU	2004
3	Main Critical Distribution Panelboard CCP - 300 A MCB	Electronics Equipment Room 124	Square D	I-Line HCM	2004
4	Panelboard CLPB1 - 225 A MLO	Electronics Equipment Room 124	Square D	NQOD	2004
5	Panelboard CLPB2 - 225 A MLO	Electronics Equipment Room 124	Square D	NQOD	2004
6	Panelboard Courtyard LP (Airport-owned) - 225 A MLO	Open Courtyard 139	Siemens	CDP-7	1989

Site ID: TUL ATCT and Base Building - Tulsa, OK					
Division	**Equipment**	**Location**	**Manufacturer**	**Model**	**Year**
Electrical - continued	**Base Building - continued**				
7	Panelboard EHPB-1 - 225 A MCB	Corridor 104	Square D	I-Line HCN	2004
8	Panelboard ELPB-1 - 225 A MLO	Electronics Equipment Room 124	Square D	NQOD	2004
9	Panelboard EPP - 300 A MCB	Electronics Equipment Room 124	Square D	I-Line HCM	2004
10	Panelboard Hall LP (Airport-owned) - 200 A MLO	Mechanical Equipment Room 121	Frank Adam	UTV	1972
11	Panelboard Hall PP (Airport-owned) - 200 A MCB	Mechanical Equipment Room 121	Frank Adam	UTV	1972
12	Panelboard KLPN (Airport-owned) - 100 A MCB	Break Room 118	Square D	NQOD	2004
13	Panelboard KPPN (Airport-owned) - 200 A MCB	Corridor 141	Square D	NQOD	2004
14	Panelboard MCIC - 250A MLO	Corridor 141	Siemens	S1	1998
15	Panelboard MCIE - 100 A MCB	Corridor 141	Square D	QO	1998
16	Panelboard MCIN (Airport-owned) - 200 A MCB	Corridor 141	Square D	QO	1994
17	Panelboard North LP (Airport-owned) - 225 A MLO	Electrical Closet 143	Square D	NQOBH	1972
18	Panelboard North PP (Airport-owned) - 600 A MLO	Electrical Closet 143	Square D	QMB	1972
19	Panelboard P1 - 225 A MLO	Electronics Equipment Room 124	GE	AQF	1995
20	Panelboard P2 - 150 A MCB	Electronics Equipment Room 124	Square D	NQOB	1988
21	Panelboard P3 - 225 A MLO	Electronics Equipment Room 124	GE	AF	1995
22	Panelboard P4 - 20 A MCB	Electronics Equipment Room 124	Westinghouse	W10B	1988
23	Panelboard P5 - 100 A MLO	Electronics Equipment Room 124	Square D	NQOD	2004
24	Transformer T-1 - 150 kVA, 480-208Y/120 V	Open Courtyard 139	Square D	150T3H	1989

Site ID: TUL ATCT and Base Building - Tulsa, OK					
Division	**Equipment**	**Location**	**Manufacturer**	**Model**	**Year**
Electrical - continued	**ATCT**				
1	Panelboard 14 (Airport-owned) - 225 A MLO	Cab Stair	ITE	NPA	1958
2	Panelboard 7th Floor PP - 225 A MLO	Vestibule 704	Siemens	CDP-7	1988
3	Panelboard AHU 1 & 2 (assumed Airport-owned)- 125 A MLO	Junction Room J02	Siemens	G1224ML3125LU	1997
4	Panelboard Back-Up A/Cs (assumed Airport-owned) - UTV A MLO	Mechancial Equipment Room 704	Square D	QO	1997
5	Panelboard Basement LP (Airport-owned) - 200 A MCB	Mechanical Equipment Room B04	Siemens	CDP-7	1988
6	Panelboard BPPE - 400 A MCB	Mechanical Equipment Room B04	Siemens	CDP-7	1988
7	Panelboard BPPE-2 - 400 A MLO	Mechanical Equipment Room B04	Siemens	CDP-7	1988
8	Panelboard EL1 - 60 A MCB	Mechanical Equipment Room B04	Siemens	P1	1994
9	Panelboard P7 - 70 A MCB	Electronics Equipment Room 705	ITE	NPA	1958
10	Panelboard P9A - 100 A MCB	Smoking Room 907	Square D	NQOD	2004
11	Panelboard P10 - 100 A MCB	Cab C01	Square D	NQOD	2004
12	Panelboard PP2 - 20 A MCB	Junction Room J02	Westinghouse	W10B	1988
13	Panelboard PP8 - 70 A MCB	Electronics Equipment Room 802	ITE	NPA24	1958
14	Panelboard PP8A - 40 A MCB	Electronics Equipment Room 802	Westinghouse	W10B	1988
15	Transformer T-3 - 30 kVA, 208-208Y/120 V	Electronics Equipment Room 705	Square D	30T85HIS	2004
16	Transformer T-4 - 15 kVA, 208-208Y/120 V	Electronics Equipment Room 802	Square D	15T85HIS	2004
17	Transformer T-5 - 30 kVA, 208-208Y/120 V	Electronics Equipment Room 802	Square D	30T85HIS	2004

Site ID: TUL ATCT and Base Building - Tulsa, OK					
Division	**Equipment**	**Location**	**Manufacturer**	**Model**	**Year**
Electrical - continued	**ATCT - continued**				
18	Transformer T-6 - 30 kVA, 208-208Y/120 V	Junction Room J02	Square D	30T85HIS	2004
Site					
1	E/G Load Bank - 300 kW	Site	Avtron	K675A D26062-5	2004
2	Transformer T-2 - 150 kVA, 480-208Y/120 V	Site	Square D	150T3HFISNL	2004
3	Transformer T-7 - 150 kVA, 480-208Y/120 V	Site	Square D	150T3H	2004

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