

Exhibit 1 depicts the Ohio company distribution system.

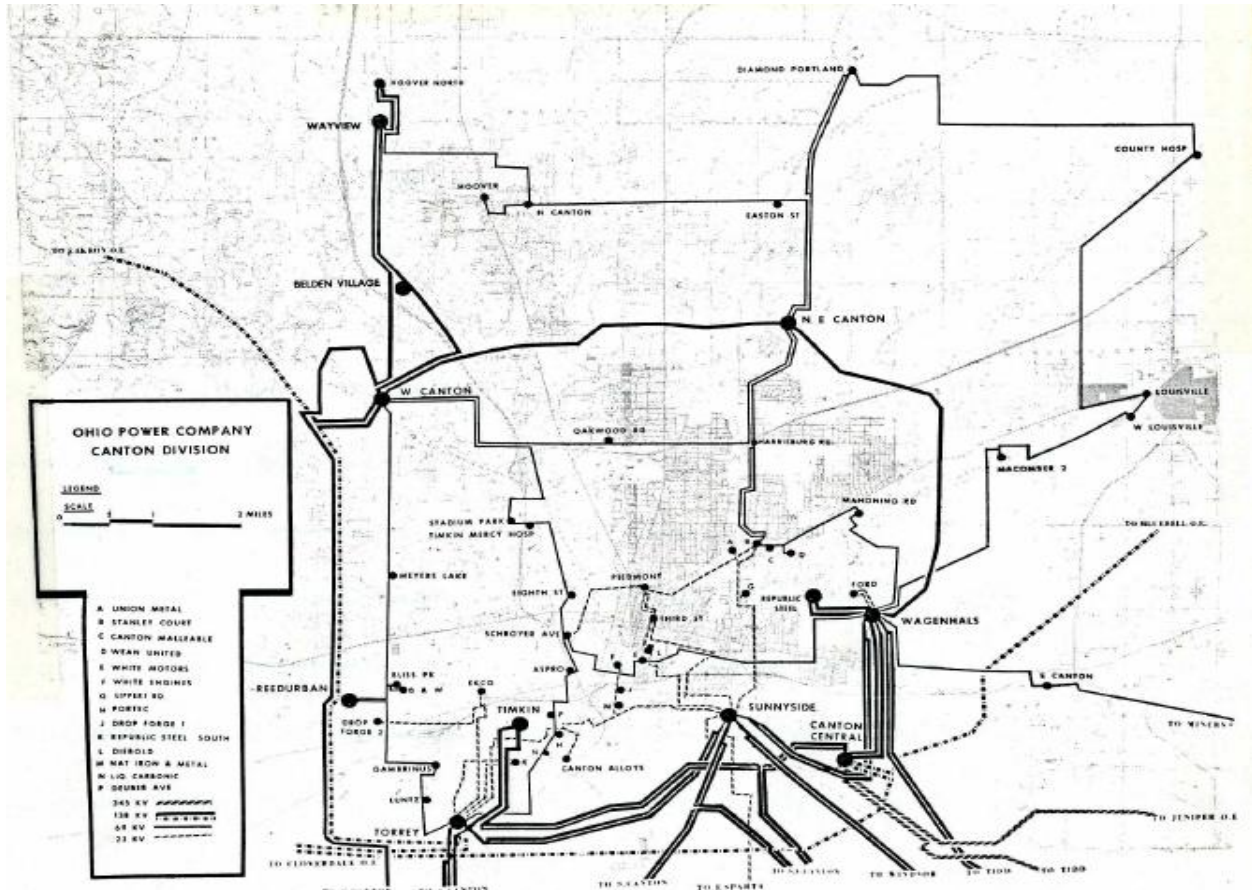


Exhibit 1: The Ohio Co. Distribution System.

The load data for Exhibit 1 is presented in Exhibit 2 below.

1) Write a simulation testbed using least square estimation to identify the model parameters.
Assume the model order is given below:

$$\hat{Y}_p(k) = \hat{a}_1(k) + \hat{a}_2(k) \sin\left(\frac{2\pi k}{12}\right) + \hat{a}_3(k) \cos\left(\frac{2\pi k}{12}\right) + \hat{a}_4(k) \sin\left(\frac{2\pi k}{24}\right) + \hat{a}_5(k) \cos\left(\frac{2\pi k}{24}\right) + \hat{a}_6(k) \sin\left(\frac{2\pi k}{168}\right) + \hat{a}_7(k) \cos\left(\frac{2\pi k}{168}\right)$$

And then compute a residual sequence $Z(k)$ as shown below :

$$Z(k) = Y(k) - \hat{Y}_p(k)$$

2) Compute correlation coefficients of process $Z(k)$, for lags $f = 1, 2, 3$.

3) Use the sequence $Z(k)$ and determine new models of the structure, i.e. $\hat{Y}(k) = \hat{Y}_p(k) + \hat{Z}(k)$

4) Calculate the prediction error

$$e(k) = Y(k) - \hat{Y}(k)$$

and

$$E^2_{2,N} = \frac{1}{N - n_2} \sum_{k=n_2+1}^N e^2(k)$$

$$|E_{1,N}| = \frac{1}{N - n_2} \sum_{k=n_2+1}^N |e(k)|$$

Plot $Y(k)$, $\hat{Y}_p(k)$ and $e(k)$ vs. k

W1 (A 168 COMPONENT ARRAY)									
387.8	377	355.3	349.1	389	415.6	468	498.2	504.9	534
519.1	542.3	523.1	509.6	487.2	529.9	527.1	496.1	467.1	478.5
479.3	497.8	463.6	392	419.4	352.3	392	428.2	412.1	410.5
457.9	488.2	475.5	496.7	515	514.7	481.2	480.4	485.1	482.3
496.2	508.7	460.2	464.3	470.6	473.3	431.7	414.2	359.4	339.4
392.7	403.4	418.6	381.3	461.1	513.7	507.2	527.4	525.4	461
440	501.3	519.1	528.7	454.8	462.3	440.4	476	536.3	494.9
446.7	371.9	338.9	339.8	409.4	379.6	407.1	399.1	471.2	512.4
529.9	532.3	517	526.9	559.6	499.9	518.9	520.8	507.1	504.9
516	508.9	445.3	512.9	454	390.5	392.5	379.6	429.8	445
417.4	453.4	477.3	538.2	553.7	563	505.4	488.2	488.2	498.1
498	506.1	491.2	460.8	446.4	413.7	404.8	349.4	339.5	320.1
303.9	282.9	290.4	255.9	262.3	311.8	302.4	327.2	323.8	316.9
301.6	334.1	344.4	328.7	327.3	313.7	280.6	305.2	320	329.1
318.1	299.8	255.6	255.6	266.2	238.6	255.8	243.9	256.4	260.3
266.7	260.1	260.9	284.9	289	304.4	314.7	294.2	265	259.9
291.1	299.8	285.9	293.1	329.8	340.5	338.1	418.6		
W2 (A 168 COMPONENT ARRAY)									
387.1	353	337.7	338.5	366.6	384.7	455.5	473.7	506.2	493.9
504.9	520.9	501.4	439.6	473.5	485.6	502.4	498.9	465.6	463.1
440.4	422	429.7	390.9	398.1	366.3	355.1	350.8	419	461.6
476.4	477.6	471.3	527.9	540.8	531.2	537.4	499.9	461.5	469
496	508.6	520.1	480.9	467.3	402.2	421	412.7	402.9	402.4
352.5	373.6	377.1	401.1	472.3	487.1	490.1	506.4	474.7	466.4
459.2	473.8	461.8	521.2	518.7	462.5	388.5	466.6	518.4	464.4
456.9	421.7	343.2	353.5	375.1	418.2	416.2	419.4	482.7	494.3
459.6	478	502.5	544.2	522.2	467.3	486.8	472.6	467.8	505.3
486.8	466.5	474	404.8	446.5	394.2	408	420.6	396.2	363.4
385.4	412	481	491.9	509.3	504.9	492.8	531.1	497.7	483.7
463.4	444.9	438.6	428.1	398.6	401.9	372.5	321.5	303.9	257.3
277.1	266.4	246.1	239.9	220.7	232.9	269.7	313.8	302.9	337.1
294.7	298.2	273.2	290.1	281.4	325.2	313.3	310.8	281.3	274.1
290.8	306.9	292.3	293.3	268	222	229.9	233.5	249.8	227.4
263.7	259.9	236.6	271	290	280.2	261.4	273.2	280.6	272.1
270.3	279.7	260.6	278.9	280.7	328.6	338.1	363.6		

Write a report and present your results.