

STEPHEN S. LOCKWOOD, PE, PMP

---

THOMAS M. ECKELS, PE  
THOMAS S. GORTON, PE

---

JAMES B. HATFIELD, PE  
BENJAMIN F. DAWSON III, PE  
ERIK C. SWANSON, PE, PMP  
DAVID J. PINION, PE  
STEPHEN PUMPLE, M.Eng, MBA, PMP  
CONSULTANTS

HATFIELD & DAWSON  
CONSULTING ELECTRICAL ENGINEERS  
9500 GREENWOOD AVE. N.  
SEATTLE, WASHINGTON 98103

TELEPHONE (206) 783-9151  
FACSIMILE (206) 789-9834  
E-MAIL hatdaw@hatdaw.com

---

MAURY L. HATFIELD, PE  
(1942-2009)  
PAUL W. LEONARD, PE  
(1925-2011)

**Engineering Statement  
KOAB-TV Auxiliary Antenna  
Channel 11 at Bend, Oregon  
June 2022**

This Engineering Statement has been prepared on behalf of Oregon Public Broadcasting, licensee of digital television station KOAB-TV at Bend, Oregon. This application requests authorization for an auxiliary (backup) antenna at the licensed KOAB-TV transmitter site

**I. Allocation Study**

An interference study has been conducted using the Commission's TVStudy software. The results of the study demonstrate that this proposal will have no additional interference impact on other stations (licenses, permits, and applications) beyond the nominal 0.5% value as permitted by the FCC Rules.

In addition, the attached contour map exhibit demonstrates that the auxiliary Noise Limited Contour will be completely contained within the licensed Noise Limited Contour.

Study created: 2022.06.07 14:55:37

Study build station data: LMS TV 2022-06-04

Proposal: KOAB-TV D11 DT APP BEND, OR  
 File number: KOAB-DT-AUX  
 Facility ID: 50588  
 Station data: User record  
 Record ID: 1397  
 Country: U.S.  
 Zone: II

Stations potentially affected by proposal:

IX	Call	Chan	Svc	Status	City, State	File Number	Distance
No	KTVL	D10	DT	LIC	MEDFORD, OR	BLANK0000115956	248.9 km
No	KOPB-TV	D10	DT	LIC	PORTLAND, OR	BLANK0000115984	195.5
No	KEET	D11	DT	LIC	EUREKA, CA	BLANK0000005864	430.7
Yes	KCBY-TV	D11	DT	LIC	COOS BAY, OR	BLCDT20090612AGE	237.3
Yes	KFFX-TV	D11	DT	LIC	PENDLETON, OR	BLCDT20140424AHO	318.9
No	KSTW	D11	DT	LIC	TACOMA, WA	BLCDT20091117AAX	400.4
No	KDRV	D12	DT	LIC	MEDFORD, OR	BLCDT20090303ACL	217.3
Yes	KPTV	D12	DT	LIC	PORTLAND, OR	BLANK0000107781	195.5

No non-directional AM stations found within 0.8 km

No directional AM stations found within 3.2 km

Record parameters as studied:

Channel: D11  
 Latitude: 44 4 40.00 N (NAD83)  
 Longitude: 121 20 1.00 W  
 Height AMSL: 1370.1 m  
 HAAT: 230.0 m  
 Peak ERP: 55.0 kW  
 Antenna: Omnidirectional  
 Elev Pattn: Generic  
 Elec Tilt: 2.00

36.0 dBu contour:

Azimuth	ERP	HAAT	Distance
0.0 deg	55.0 kW	376.6 m	112.3 km
45.0	55.0	351.3	110.3
90.0	55.0	310.0	106.9
135.0	55.0	223.8	101.4
180.0	55.0	163.2	95.3
225.0	55.0	93.3	83.3
270.0	55.0	28.3	64.4
315.0	55.0	289.3	105.5

Database HAAT does not agree with computed HAAT  
 Database HAAT: 230 m Computed HAAT: 229 m

Distance to Canadian border: 490.2 km

Distance to Mexican border: 1320.3 km

Conditions at FCC monitoring station: Ferndale WA  
 Bearing: 350.7 degrees Distance: 550.1 km

Proposal is not within the West Virginia quiet zone area

Conditions at Table Mountain receiving zone:  
Bearing: 102.7 degrees Distance: 1393.0 km

Study cell size: 2.00 km  
Profile point spacing: 1.00 km

Maximum new IX to full-service and Class A: 0.50%  
Maximum new IX to LPTV: 2.00%

No IX check failures found.

## II. Facilities Proposed

The proposed operation will be on Channel 11 with an effective radiated power of 55 kilowatts. Operation is proposed with a Dielectric model TLS-V4B antenna, which will be mounted on an existing tower on Awbrey Butte, with FCC Antenna Structure Registration Number 1035880.

## III. RF Exposure Calculations

OET Bulletin 65 *Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields* (Edition 97-01) states in part that:

When performing an evaluation for compliance with the FCC's RF guidelines all significant contributors to the ambient RF environment should be considered. . . For purposes of such consideration, significance can be taken to mean any transmitter producing more than 5% of the applicable exposure limit (in terms of power density or the square of the electric or magnetic field strength) at accessible locations.

As will be demonstrated below, the proposed operation will produce less than 5% of the applicable exposure limit for both controlled and uncontrolled environments. Thus, the proposed facility is categorically exempted from the requirement of further study. Therefore, pursuant to §1.1307 of the Commission's Rules no calculations are required for the other FM and TV facilities in the vicinity, and precise calculations are made only with regard to the levels from this proposal.

The power density calculations shown below were made using the techniques outlined in OET Bulletin No. 65. "Ground level" calculations in this report have been made at a reference height of 2 meters above ground to provide a worst-case estimate of exposure for persons standing on the ground in the vicinity of the tower. The equation shown below was used to calculate the ground level power density figures from each antenna.

$$S(\mu W / cm^2) = \frac{33.40981 \times AdjERP(Watts)}{D^2}$$

Where: *AdjERP(Watts)* is the maximum lobe effective radiated power times the element pattern factor times the array pattern factor.

*D* is the distance in meters from the center of radiation to the calculation point.

“Worst case” power density levels produced by the proposed facility were calculated for an elevation of 2 meters above ground, using the manufacturer’s vertical plane pattern for the Dielectric model TLS-V4B antenna proposed in this application. The highest calculated power density from the proposed antenna alone occurs at a point 183 meters from the base of the antenna support structure. At this point the power density is calculated to be 4.3  $\mu W/cm^2$ , which is 2.15% of 200  $\mu W/cm^2$  (the FCC maximum for uncontrolled environments at the Channel 11 frequency).

These calculations show that the maximum calculated power density produced at two meters above ground level by the proposed operation alone is less than 5% of the applicable FCC exposure limit at all locations between 1 and 1000 meters from the base of the antenna support structure. Section 1.1307 of the Commission’s Rules exempts applications for new facilities or modifications to existing facilities from the requirement of preparing an environmental assessment when the calculated emissions from the applicants proposed facility are predicted to be less than 5% of the applicable FCC exposure limit. Therefore, the proposed facility is in compliance with Section 1.1301 *et seq* and no further analysis of RF exposure at this site is required in this application.

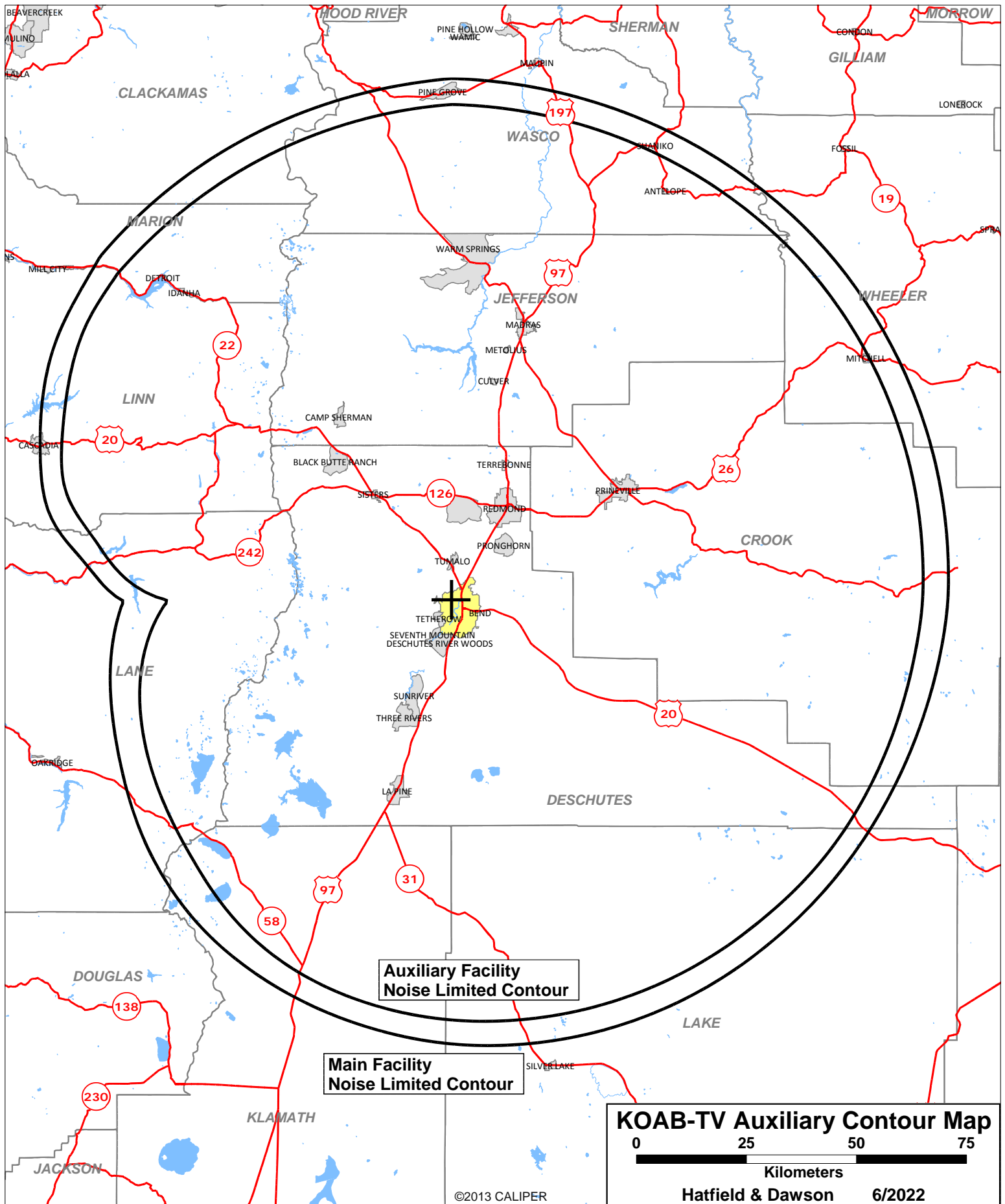
The Awbrey Butte communications site hosts several towers and broadcast stations, along with other users including microwave and land mobile operations. The KOAB-TV tower is surrounded by a fence with an effective locked gate to prevent unauthorized personnel from accessing the communications site compound. In addition, the Awbrey Butte communications site itself is surrounded by an additional fence with a locked gate to prevent access by members of the general population. The Awbrey Butte communications site is considered to be a controlled environment.

Pursuant to OET Bulletin No. 65, all station personnel and contractors are required to follow appropriate safety procedures before any work is commenced on the antenna tower, including reduction in power or discontinuance of operation before any maintenance work is undertaken. The permittee/licensee in coordination with other users of the site must reduce power or cease operation as necessary to protect persons having access to the site, tower or antenna from radiofrequency exposure in excess of FCC guidelines.

June 7, 2022

Erik C. Swanson, P.E.

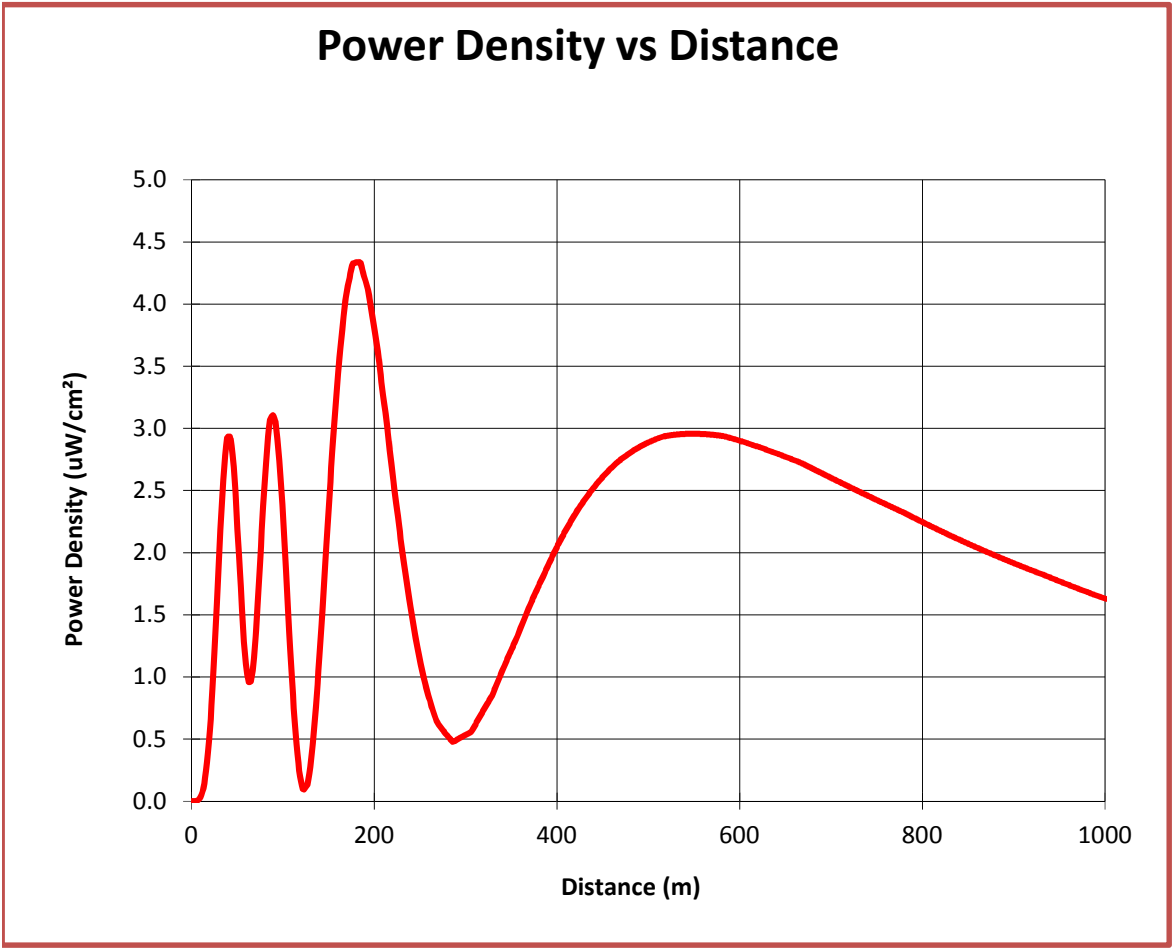
Consulting Engineer



**KOAB-TV Ch11 Bend Auxiliary Antenna**  
**Ground-Level Power Density Calculations**  
Using Manufacturer's Vertical Plane Pattern

Antenna	TLS-V4B		
ERP	55,000	Watts H (avg)	
	-	Watts V (avg)	
Antenna AGL	83.8	meters less 2m is	81.8 meters above the reference plane
MBT	0	degrees	

Calculated  
Maximum is                      4.3 uW/cm² at                      183 meters from the tower



KOAB-TV Ch11 Bend Auxiliary Antenna  
Ground-Level Power Density Calculations  
Using Manufacturer's Vertical Plane Pattern

Distance From Tower (meters)	Hypotenuse (meters)	Depression Angle (with MBT adjust) (degrees)	Interpolated Rel Field	Adjusted ERP (watts)	Power Density uW/cm²						
0	81.80	90.00	0.000	0.0	0.00	49	95.35	59.08	0.105	610.9	2.24
1	81.81	89.30	0.000	0.0	0.00	50	95.87	58.56	0.103	581.5	2.11
2	81.82	88.60	0.000	0.0	0.00	51	96.40	58.06	0.100	553.2	1.99
3	81.85	87.90	0.001	0.1	0.00	52	96.93	57.56	0.097	521.1	1.85
4	81.90	87.20	0.003	0.4	0.00	53	97.47	57.06	0.094	489.7	1.72
5	81.95	86.50	0.004	0.9	0.00	54	98.02	56.57	0.091	455.3	1.58
6	82.02	85.80	0.005	1.6	0.01	55	98.57	56.08	0.088	422.0	1.45
7	82.10	85.11	0.007	2.5	0.01	56	99.13	55.60	0.085	393.9	1.34
8	82.19	84.41	0.009	4.2	0.02	57	99.70	55.13	0.082	367.9	1.24
9	82.29	83.72	0.011	6.8	0.03	58	100.28	54.66	0.079	345.9	1.15
10	82.41	83.03	0.014	10.6	0.05	59	100.86	54.20	0.077	326.0	1.07
11	82.54	82.34	0.017	15.2	0.07	60	101.45	53.74	0.075	313.3	1.02
12	82.68	81.65	0.020	21.4	0.10	61	102.04	53.29	0.075	305.9	0.98
13	82.83	80.97	0.023	29.5	0.14	62	102.64	52.84	0.074	302.5	0.96
14	82.99	80.29	0.027	38.8	0.19	63	103.25	52.40	0.075	306.1	0.96
15	83.16	79.61	0.030	50.7	0.24	64	103.86	51.96	0.075	311.0	0.96
16	83.35	78.93	0.034	65.1	0.31	65	104.48	51.53	0.077	329.1	1.01
17	83.55	78.26	0.038	81.3	0.39	66	105.11	51.10	0.079	347.5	1.05
18	83.76	77.59	0.042	99.2	0.47	67	105.74	50.68	0.083	374.9	1.12
19	83.98	76.92	0.046	118.7	0.56	68	106.37	50.26	0.086	405.8	1.20
20	84.21	76.26	0.050	139.9	0.66	69	107.02	49.85	0.090	441.9	1.29
21	84.45	75.60	0.055	165.1	0.77	70	107.66	49.44	0.094	487.1	1.40
22	84.71	74.95	0.059	193.9	0.90	71	108.32	49.04	0.099	533.9	1.52
23	84.97	74.30	0.064	224.8	1.04	72	108.97	48.65	0.103	586.3	1.65
24	85.25	73.65	0.068	257.8	1.19	73	109.64	48.25	0.108	641.0	1.78
25	85.54	73.01	0.073	292.8	1.34	74	110.31	47.87	0.113	697.4	1.92
26	85.83	72.37	0.077	324.4	1.47	75	110.98	47.48	0.117	755.5	2.05
27	86.14	71.73	0.081	359.7	1.62	76	111.66	47.10	0.122	815.1	2.18
28	86.46	71.10	0.085	399.9	1.79	77	112.34	46.73	0.126	872.6	2.31
29	86.79	70.48	0.089	436.9	1.94	78	113.03	46.36	0.130	929.7	2.43
30	87.13	69.86	0.093	474.1	2.09	79	113.72	46.00	0.134	987.9	2.55
31	87.48	69.24	0.097	512.5	2.24	80	114.42	45.64	0.138	1041.8	2.66
32	87.84	68.63	0.100	548.1	2.37	81	115.12	45.28	0.141	1096.3	2.76
33	88.21	68.03	0.103	581.8	2.50	82	115.82	44.93	0.145	1149.4	2.86
34	88.58	67.43	0.105	609.6	2.60	83	116.53	44.58	0.147	1194.0	2.94
35	88.97	66.84	0.108	637.5	2.69	84	117.25	44.24	0.150	1238.8	3.01
36	89.37	66.25	0.110	665.7	2.78	85	117.97	43.90	0.152	1277.4	3.07
37	89.78	65.66	0.112	690.1	2.86	86	118.69	43.57	0.154	1299.9	3.08
38	90.20	65.08	0.114	711.7	2.92	87	119.42	43.24	0.155	1322.4	3.10
39	90.62	64.51	0.114	720.9	2.93	88	120.15	42.91	0.156	1341.6	3.11
40	91.06	63.94	0.115	728.1	2.93	89	120.88	42.59	0.157	1352.7	3.09
41	91.50	63.38	0.116	735.3	2.93	90	121.62	42.27	0.157	1363.7	3.08
42	91.95	62.82	0.116	737.8	2.92	91	122.36	41.95	0.158	1370.5	3.06
43	92.41	62.27	0.115	730.8	2.86	92	123.11	41.64	0.157	1354.4	2.99
44	92.88	61.72	0.114	720.4	2.79	93	123.86	41.33	0.156	1338.5	2.92
						94	124.61	41.03	0.155	1322.9	2.85
						95	125.36	40.73	0.153	1293.9	2.75
						96	126.12	40.43	0.152	1264.1	2.65

Hatfield Dawson Consulting Engineers

Hatfield Dawson Consulting Engineers

97	126.89	40.14	0.150	1235.0	2.56	149	169.98	28.77	0.191	2015.0	2.33
98	127.65	39.85	0.147	1194.4	2.45	150	170.85	28.61	0.197	2139.2	2.45
99	128.42	39.57	0.144	1144.0	2.32	151	171.73	28.45	0.203	2265.7	2.57
100	129.19	39.28	0.141	1095.2	2.19	152	172.61	28.29	0.209	2394.6	2.69
101	129.97	39.00	0.138	1048.1	2.07	153	173.49	28.13	0.214	2525.7	2.80
102	130.75	38.73	0.134	982.5	1.92	154	174.38	27.98	0.220	2655.9	2.92
103	131.53	38.46	0.129	919.4	1.78	155	175.26	27.82	0.225	2772.1	3.02
104	132.31	38.19	0.125	859.1	1.64	156	176.15	27.67	0.229	2889.5	3.11
105	133.10	37.92	0.120	797.4	1.50	157	177.03	27.52	0.234	3008.2	3.21
106	133.89	37.66	0.115	729.2	1.36	158	177.92	27.37	0.238	3128.0	3.30
107	134.69	37.40	0.110	664.9	1.22	159	178.81	27.22	0.243	3249.0	3.40
108	135.48	37.14	0.105	604.2	1.10	160	179.70	27.08	0.248	3371.0	3.49
109	136.28	36.89	0.099	543.4	0.98	161	180.59	26.93	0.252	3486.7	3.57
110	137.08	36.64	0.094	482.1	0.86	162	181.48	26.79	0.256	3594.5	3.65
111	137.88	36.39	0.088	425.2	0.75	163	182.37	26.65	0.259	3702.8	3.72
112	138.69	36.14	0.082	372.4	0.65	164	183.27	26.51	0.263	3811.6	3.79
113	139.50	35.90	0.076	321.2	0.55	165	184.16	26.37	0.267	3921.0	3.86
114	140.31	35.66	0.070	271.0	0.46	166	185.06	26.23	0.271	4030.8	3.93
115	141.12	35.42	0.064	225.5	0.38	167	185.96	26.10	0.274	4141.0	4.00
116	141.94	35.19	0.058	184.7	0.31	168	186.86	25.96	0.278	4243.5	4.06
117	142.76	34.96	0.052	149.5	0.25	169	187.76	25.83	0.280	4325.5	4.10
118	143.58	34.73	0.047	123.3	0.20	170	188.66	25.70	0.283	4407.5	4.14
119	144.40	34.50	0.043	99.8	0.16	171	189.56	25.56	0.286	4489.5	4.17
120	145.23	34.28	0.038	79.0	0.13	172	190.46	25.43	0.288	4571.5	4.21
121	146.06	34.06	0.033	60.8	0.10	173	191.36	25.31	0.291	4653.4	4.25
122	146.89	33.84	0.033	60.9	0.09	174	192.27	25.18	0.293	4735.3	4.28
123	147.72	33.63	0.035	67.4	0.10	175	193.17	25.05	0.296	4817.1	4.31
124	148.55	33.41	0.037	74.1	0.11	176	194.08	24.93	0.298	4879.9	4.33
125	149.39	33.20	0.038	81.1	0.12	177	194.99	24.80	0.299	4928.7	4.33
126	150.22	32.99	0.040	89.1	0.13	178	195.90	24.68	0.301	4977.3	4.33
127	151.06	32.79	0.047	119.7	0.18	179	196.81	24.56	0.302	5025.7	4.34
128	151.91	32.58	0.053	154.4	0.22	180	197.72	24.44	0.304	5073.9	4.34
129	152.75	32.38	0.059	193.1	0.28	181	198.63	24.32	0.305	5121.8	4.34
130	153.59	32.18	0.065	235.5	0.33	182	199.54	24.20	0.307	5169.6	4.34
131	154.44	31.98	0.072	282.5	0.40	183	200.45	24.08	0.308	5217.1	4.34
132	155.29	31.79	0.079	342.4	0.47	184	201.36	23.97	0.309	5255.8	4.33
133	156.14	31.59	0.086	407.3	0.56	185	202.28	23.85	0.310	5271.4	4.30
134	156.99	31.40	0.093	477.0	0.65	186	203.19	23.74	0.310	5287.0	4.28
135	157.85	31.21	0.100	551.4	0.74	187	204.11	23.63	0.310	5302.4	4.25
136	158.70	31.03	0.107	630.3	0.84	188	205.02	23.51	0.311	5317.7	4.23
137	159.56	30.84	0.114	715.5	0.94	189	205.94	23.40	0.311	5332.9	4.20
138	160.42	30.66	0.121	805.5	1.05	190	206.86	23.29	0.312	5348.0	4.18
139	161.28	30.48	0.128	899.7	1.16	191	207.78	23.18	0.312	5363.0	4.15
140	162.15	30.30	0.135	998.1	1.27	192	208.70	23.08	0.313	5377.8	4.13
141	163.01	30.12	0.141	1100.4	1.38	193	209.62	22.97	0.313	5382.9	4.09
142	163.88	29.94	0.148	1205.7	1.50	194	210.54	22.86	0.312	5364.7	4.04
143	164.74	29.77	0.154	1312.6	1.62	195	211.46	22.76	0.312	5346.6	3.99
144	165.61	29.60	0.161	1422.8	1.73	196	212.38	22.65	0.311	5328.7	3.95
145	166.48	29.43	0.167	1536.2	1.85	197	213.31	22.55	0.311	5311.0	3.90
146	167.35	29.26	0.173	1652.8	1.97	198	214.23	22.45	0.310	5293.5	3.85
147	168.23	29.09	0.180	1772.3	2.09	199	215.16	22.35	0.310	5276.2	3.81
148	169.10	28.93	0.186	1893.3	2.21	200	216.08	22.24	0.309	5259.0	3.76



201	217.01	22.14	0.309	5242.0	3.72	253	265.90	17.92	0.196	2116.8	1.00
202	217.93	22.05	0.308	5225.2	3.68	254	266.85	17.85	0.194	2068.6	0.97
203	218.86	21.95	0.307	5190.7	3.62	255	267.80	17.79	0.192	2021.3	0.94
204	219.79	21.85	0.306	5141.5	3.56	256	268.75	17.72	0.189	1974.9	0.91
205	220.72	21.75	0.304	5092.9	3.49	257	269.70	17.66	0.187	1929.3	0.89
206	221.65	21.66	0.303	5044.9	3.43	258	270.66	17.59	0.185	1884.6	0.86
207	222.58	21.56	0.301	4997.5	3.37	259	271.61	17.53	0.183	1840.7	0.83
208	223.51	21.47	0.300	4950.8	3.31	260	272.56	17.46	0.181	1797.7	0.81
209	224.44	21.37	0.299	4904.6	3.25	261	273.52	17.40	0.179	1755.4	0.78
210	225.37	21.28	0.297	4859.1	3.20	262	274.47	17.34	0.177	1713.9	0.76
211	226.30	21.19	0.296	4814.1	3.14	263	275.43	17.28	0.174	1673.2	0.74
212	227.23	21.10	0.294	4769.7	3.09	264	276.38	17.22	0.172	1633.3	0.71
213	228.17	21.01	0.293	4725.9	3.03	265	277.34	17.15	0.170	1594.2	0.69
214	229.10	20.92	0.291	4656.7	2.96	266	278.29	17.09	0.168	1555.7	0.67
215	230.04	20.83	0.289	4585.8	2.90	267	279.25	17.03	0.166	1518.0	0.65
216	230.97	20.74	0.287	4516.0	2.83	268	280.21	16.97	0.165	1490.6	0.63
217	231.91	20.65	0.284	4447.3	2.76	269	281.16	16.91	0.164	1475.6	0.62
218	232.84	20.57	0.282	4379.7	2.70	270	282.12	16.85	0.163	1460.7	0.61
219	233.78	20.48	0.280	4313.1	2.64	271	283.08	16.80	0.162	1446.0	0.60
220	234.72	20.40	0.278	4247.6	2.58	272	284.03	16.74	0.161	1431.5	0.59
221	235.65	20.31	0.276	4183.1	2.52	273	284.99	16.68	0.161	1417.2	0.58
222	236.59	20.23	0.274	4119.6	2.46	274	285.95	16.62	0.160	1403.0	0.57
223	237.53	20.14	0.272	4057.1	2.40	275	286.91	16.57	0.159	1389.0	0.56
224	238.47	20.06	0.270	3995.5	2.35	276	287.87	16.51	0.158	1375.1	0.55
225	239.41	19.98	0.267	3930.6	2.29	277	288.83	16.45	0.157	1361.4	0.55
226	240.35	19.90	0.265	3854.3	2.23	278	289.78	16.40	0.157	1347.9	0.54
227	241.29	19.82	0.262	3779.3	2.17	279	290.74	16.34	0.156	1334.5	0.53
228	242.23	19.74	0.260	3705.7	2.11	280	291.70	16.29	0.155	1321.3	0.52
229	243.17	19.66	0.257	3633.4	2.05	281	292.66	16.23	0.154	1308.2	0.51
230	244.11	19.58	0.254	3562.3	2.00	282	293.62	16.18	0.153	1295.3	0.50
231	245.06	19.50	0.252	3492.4	1.94	283	294.58	16.12	0.153	1282.5	0.49
232	246.00	19.42	0.250	3423.8	1.89	284	295.55	16.07	0.152	1269.9	0.49
233	246.94	19.34	0.247	3356.4	1.84	285	296.51	16.01	0.151	1257.4	0.48
234	247.89	19.27	0.245	3290.2	1.79	286	297.47	15.96	0.152	1268.9	0.48
235	248.83	19.19	0.242	3225.1	1.74	287	298.43	15.91	0.153	1289.3	0.48
236	249.77	19.12	0.240	3161.1	1.69	288	299.39	15.86	0.154	1309.7	0.49
237	250.72	19.04	0.237	3098.3	1.65	289	300.35	15.80	0.156	1330.1	0.49
238	251.66	18.97	0.235	3032.3	1.60	290	301.32	15.75	0.157	1350.5	0.50
239	252.61	18.89	0.232	2962.3	1.55	291	302.28	15.70	0.158	1371.0	0.50
240	253.56	18.82	0.229	2893.6	1.50	292	303.24	15.65	0.159	1391.5	0.51
241	254.50	18.75	0.227	2826.2	1.46	293	304.20	15.60	0.160	1412.0	0.51
242	255.45	18.68	0.224	2760.1	1.41	294	305.17	15.55	0.161	1432.6	0.51
243	256.40	18.60	0.221	2695.2	1.37	295	306.13	15.50	0.163	1453.1	0.52
244	257.35	18.53	0.219	2631.6	1.33	296	307.09	15.45	0.164	1473.7	0.52
245	258.29	18.46	0.216	2569.2	1.29	297	308.06	15.40	0.165	1494.3	0.53
246	259.24	18.39	0.214	2508.0	1.25	298	309.02	15.35	0.166	1514.9	0.53
247	260.19	18.32	0.211	2448.0	1.21	299	309.99	15.30	0.167	1535.5	0.53
248	261.14	18.25	0.208	2389.1	1.17	300	310.95	15.25	0.168	1556.1	0.54
249	262.09	18.19	0.206	2331.4	1.13	301	311.92	15.20	0.169	1576.8	0.54
250	263.04	18.12	0.203	2274.8	1.10	302	312.88	15.16	0.170	1597.4	0.55
251	263.99	18.05	0.201	2219.2	1.06	303	313.85	15.11	0.172	1618.1	0.55
252	264.94	17.98	0.198	2165.9	1.03	304	314.81	15.06	0.173	1638.7	0.55

Hatfield Dawson Consulting Engineers

Hatfield Dawson Consulting Engineers

305	315.78	15.01	0.174	1659.4	0.56	357	366.25	12.91	0.314	5427.2	1.35
306	316.74	14.97	0.176	1701.4	0.57	358	367.23	12.87	0.317	5531.2	1.37
307	317.71	14.92	0.178	1752.3	0.58	359	368.20	12.84	0.320	5635.7	1.39
308	318.68	14.87	0.181	1803.5	0.59	360	369.18	12.80	0.323	5740.6	1.41
309	319.64	14.83	0.184	1855.2	0.61	361	370.15	12.77	0.326	5845.9	1.43
310	320.61	14.78	0.186	1907.3	0.62	362	371.13	12.73	0.329	5951.6	1.44
311	321.58	14.74	0.189	1959.8	0.63	363	372.10	12.70	0.332	6057.7	1.46
312	322.54	14.69	0.191	2012.7	0.65	364	373.08	12.67	0.335	6164.1	1.48
313	323.51	14.65	0.194	2066.0	0.66	365	374.05	12.63	0.338	6270.9	1.50
314	324.48	14.60	0.196	2119.6	0.67	366	375.03	12.60	0.341	6378.1	1.52
315	325.45	14.56	0.199	2173.6	0.69	367	376.01	12.57	0.343	6485.6	1.53
316	326.42	14.51	0.201	2228.0	0.70	368	376.98	12.53	0.346	6593.5	1.55
317	327.38	14.47	0.204	2282.7	0.71	369	377.96	12.50	0.349	6701.7	1.57
318	328.35	14.43	0.206	2337.8	0.72	370	378.93	12.47	0.352	6810.2	1.58
319	329.32	14.38	0.209	2393.1	0.74	371	379.91	12.43	0.355	6919.0	1.60
320	330.29	14.34	0.211	2448.8	0.75	372	380.89	12.40	0.357	7028.1	1.62
321	331.26	14.30	0.213	2504.8	0.76	373	381.86	12.37	0.360	7137.5	1.64
322	332.23	14.25	0.216	2561.1	0.78	374	382.84	12.34	0.363	7247.1	1.65
323	333.20	14.21	0.218	2617.7	0.79	375	383.82	12.31	0.366	7357.1	1.67
324	334.17	14.17	0.221	2674.6	0.80	376	384.80	12.27	0.368	7467.3	1.68
325	335.14	14.13	0.223	2731.7	0.81	377	385.77	12.24	0.371	7577.7	1.70
326	336.11	14.09	0.225	2789.1	0.82	378	386.75	12.21	0.374	7688.4	1.72
327	337.08	14.04	0.228	2846.8	0.84	379	387.73	12.18	0.377	7799.4	1.73
328	338.05	14.00	0.230	2904.7	0.85	380	388.70	12.15	0.379	7910.6	1.75
329	339.02	13.96	0.233	2962.1	0.87	381	389.68	12.12	0.382	8022.0	1.76
330	339.99	13.92	0.236	3061.8	0.88	382	390.66	12.09	0.385	8133.6	1.78
331	340.96	13.88	0.239	3142.1	0.90	383	391.64	12.06	0.387	8245.4	1.80
332	341.93	13.84	0.242	3222.9	0.92	384	392.62	12.03	0.390	8357.4	1.81
333	342.90	13.80	0.245	3304.3	0.94	385	393.59	12.00	0.392	8470.7	1.83
334	343.87	13.76	0.248	3386.3	0.96	386	394.57	11.96	0.395	8589.6	1.84
335	344.84	13.72	0.251	3468.8	0.97	387	395.55	11.93	0.398	8708.9	1.86
336	345.81	13.68	0.254	3551.8	0.99	388	396.53	11.91	0.401	8828.3	1.88
337	346.79	13.64	0.257	3635.3	1.01	389	397.51	11.88	0.403	8947.9	1.89
338	347.76	13.60	0.260	3719.3	1.03	390	398.49	11.85	0.406	9067.8	1.91
339	348.73	13.57	0.263	3803.8	1.04	391	399.46	11.82	0.409	9187.9	1.92
340	349.70	13.53	0.266	3888.7	1.06	392	400.44	11.79	0.411	9308.1	1.94
341	350.67	13.49	0.269	3974.2	1.08	393	401.42	11.76	0.414	9428.6	1.95
342	351.65	13.45	0.272	4060.0	1.10	394	402.40	11.73	0.417	9549.2	1.97
343	352.62	13.41	0.275	4146.3	1.11	395	403.38	11.70	0.419	9670.0	1.99
344	353.59	13.38	0.277	4233.1	1.13	396	404.36	11.67	0.422	9791.0	2.00
345	354.56	13.34	0.280	4320.2	1.15	397	405.34	11.64	0.425	9912.1	2.02
346	355.54	13.30	0.283	4407.8	1.16	398	406.32	11.61	0.427	10033.4	2.03
347	356.51	13.26	0.286	4495.7	1.18	399	407.30	11.59	0.430	10154.9	2.05
348	357.48	13.23	0.289	4584.0	1.20	400	408.28	11.56	0.432	10276.5	2.06
349	358.46	13.19	0.291	4672.7	1.21	401	409.26	11.53	0.435	10398.2	2.07
350	359.43	13.15	0.294	4761.8	1.23	402	410.24	11.50	0.437	10520.0	2.09
351	360.41	13.12	0.297	4851.2	1.25	403	411.22	11.47	0.440	10642.0	2.10
352	361.38	13.08	0.300	4941.0	1.26	404	412.20	11.45	0.442	10764.1	2.12
353	362.35	13.05	0.302	5031.0	1.28	405	413.18	11.42	0.445	10886.3	2.13
354	363.33	13.01	0.305	5121.5	1.30	406	414.16	11.39	0.447	11008.6	2.14
355	364.30	12.98	0.308	5220.4	1.31	407	415.14	11.36	0.450	11131.1	2.16
356	365.28	12.94	0.311	5323.6	1.33	408	416.12	11.34	0.452	11253.6	2.17

409	417.10	11.31	0.455	11376.2	2.18	461	468.20	10.06	0.567	17708.9	2.70
410	418.08	11.28	0.457	11498.9	2.20	462	469.19	10.04	0.569	17829.0	2.71
411	419.06	11.26	0.460	11621.6	2.21	463	470.17	10.02	0.571	17948.9	2.71
412	420.04	11.23	0.462	11744.5	2.22	464	471.16	10.00	0.573	18068.5	2.72
413	421.02	11.20	0.465	11867.4	2.24	465	472.14	9.98	0.575	18185.6	2.73
414	422.00	11.18	0.467	11990.3	2.25	466	473.12	9.96	0.577	18302.6	2.73
415	422.98	11.15	0.469	12113.4	2.26	467	474.11	9.94	0.579	18419.5	2.74
416	423.97	11.12	0.472	12236.5	2.27	468	475.09	9.91	0.581	18536.2	2.74
417	424.95	11.10	0.474	12359.6	2.29	469	476.08	9.89	0.582	18652.8	2.75
418	425.93	11.07	0.476	12482.8	2.30	470	477.07	9.87	0.584	18769.3	2.76
419	426.91	11.05	0.479	12606.0	2.31	471	478.05	9.85	0.586	18885.7	2.76
420	427.89	11.02	0.481	12729.2	2.32	472	479.04	9.83	0.588	19002.0	2.77
421	428.87	11.00	0.483	12852.3	2.33	473	480.02	9.81	0.590	19118.1	2.77
422	429.85	10.97	0.486	12974.2	2.35	474	481.01	9.79	0.591	19234.2	2.78
423	430.84	10.94	0.488	13096.2	2.36	475	481.99	9.77	0.593	19350.1	2.78
424	431.82	10.92	0.490	13218.2	2.37	476	482.98	9.75	0.595	19465.8	2.79
425	432.80	10.89	0.492	13340.2	2.38	477	483.96	9.73	0.597	19581.5	2.79
426	433.78	10.87	0.495	13462.2	2.39	478	484.95	9.71	0.598	19697.0	2.80
427	434.76	10.84	0.497	13584.2	2.40	479	485.93	9.69	0.600	19812.4	2.80
428	435.75	10.82	0.499	13706.2	2.41	480	486.92	9.67	0.602	19927.6	2.81
429	436.73	10.80	0.501	13828.2	2.42	481	487.91	9.65	0.604	20042.7	2.81
430	437.71	10.77	0.504	13950.1	2.43	482	488.89	9.63	0.605	20157.7	2.82
431	438.69	10.75	0.506	14072.1	2.44	483	489.88	9.61	0.607	20272.5	2.82
432	439.68	10.72	0.508	14194.0	2.45	484	490.86	9.59	0.609	20387.3	2.83
433	440.66	10.70	0.510	14316.0	2.46	485	491.85	9.57	0.611	20501.8	2.83
434	441.64	10.67	0.512	14437.8	2.47	486	492.84	9.55	0.612	20616.2	2.84
435	442.62	10.65	0.515	14559.7	2.48	487	493.82	9.53	0.614	20730.5	2.84
436	443.61	10.63	0.517	14681.6	2.49	488	494.81	9.52	0.616	20844.7	2.84
437	444.59	10.60	0.519	14803.4	2.50	489	495.79	9.50	0.617	20958.7	2.85
438	445.57	10.58	0.521	14925.1	2.51	490	496.78	9.48	0.619	21072.5	2.85
439	446.56	10.56	0.523	15046.8	2.52	491	497.77	9.46	0.621	21186.3	2.86
440	447.54	10.53	0.525	15168.5	2.53	492	498.75	9.44	0.622	21299.8	2.86
441	448.52	10.51	0.527	15290.2	2.54	493	499.74	9.42	0.624	21413.3	2.86
442	449.51	10.48	0.529	15411.7	2.55	494	500.73	9.40	0.626	21526.5	2.87
443	450.49	10.46	0.531	15533.3	2.56	495	501.71	9.38	0.627	21639.7	2.87
444	451.47	10.44	0.534	15654.8	2.57	496	502.70	9.36	0.629	21752.6	2.88
445	452.46	10.42	0.536	15776.2	2.57	497	503.69	9.35	0.631	21865.5	2.88
446	453.44	10.39	0.538	15897.5	2.58	498	504.67	9.33	0.632	21978.1	2.88
447	454.42	10.37	0.540	16018.8	2.59	499	505.66	9.31	0.634	22090.7	2.89
448	455.41	10.35	0.542	16140.1	2.60	500	506.65	9.29	0.635	22203.0	2.89
449	456.39	10.33	0.544	16261.2	2.61	501	507.63	9.27	0.637	22315.3	2.89
450	457.37	10.30	0.546	16382.3	2.62	502	508.62	9.25	0.639	22427.3	2.90
451	458.36	10.28	0.548	16503.3	2.62	503	509.61	9.24	0.640	22539.2	2.90
452	459.34	10.26	0.550	16624.3	2.63	504	510.59	9.22	0.642	22651.0	2.90
453	460.33	10.24	0.552	16745.1	2.64	505	511.58	9.20	0.643	22762.6	2.91
454	461.31	10.21	0.554	16865.9	2.65	506	512.57	9.18	0.645	22874.0	2.91
455	462.29	10.19	0.556	16986.6	2.66	507	513.56	9.17	0.646	22985.3	2.91
456	463.28	10.17	0.558	17107.2	2.66	508	514.54	9.15	0.648	23096.4	2.91
457	464.26	10.15	0.560	17227.7	2.67	509	515.53	9.13	0.650	23207.4	2.92
458	465.25	10.13	0.562	17348.2	2.68	510	516.52	9.11	0.651	23318.2	2.92
459	466.23	10.10	0.564	17468.5	2.68	511	517.51	9.09	0.653	23428.9	2.92
460	467.22	10.08	0.566	17588.8	2.69	512	518.49	9.08	0.654	23539.3	2.93

Hatfield Dawson Consulting Engineers

Hatfield Dawson Consulting Engineers

513	519.48	9.06	0.856	23649.7	2.93	565	570.89	8.24	0.723	28788.8	2.95
514	520.47	9.04	0.857	23759.8	2.93	566	571.88	8.22	0.725	28882.5	2.95
515	521.46	9.03	0.859	23869.8	2.93	567	572.87	8.21	0.726	28976.1	2.95
516	522.44	9.01	0.860	23979.7	2.94	568	573.86	8.20	0.727	29069.5	2.95
517	523.43	8.99	0.862	24085.3	2.94	569	574.85	8.18	0.728	29162.8	2.95
518	524.42	8.97	0.863	24187.3	2.94	570	575.84	8.17	0.729	29255.9	2.95
519	525.41	8.96	0.865	24289.2	2.94	571	576.83	8.15	0.730	29348.7	2.95
520	526.39	8.94	0.866	24390.9	2.94	572	577.82	8.14	0.732	29441.5	2.95
521	527.38	8.92	0.867	24492.4	2.94	573	578.81	8.12	0.733	29534.0	2.95
522	528.37	8.91	0.869	24593.7	2.94	574	579.80	8.11	0.734	29626.4	2.94
523	529.36	8.89	0.870	24694.9	2.94	575	580.79	8.10	0.735	29718.6	2.94
524	530.35	8.87	0.871	24795.9	2.95	576	581.78	8.08	0.736	29810.7	2.94
525	531.33	8.86	0.873	24896.8	2.95	577	582.77	8.07	0.737	29902.5	2.94
526	532.32	8.84	0.874	24997.4	2.95	578	583.76	8.06	0.738	29994.2	2.94
527	533.31	8.82	0.876	25097.9	2.95	579	584.75	8.04	0.740	30085.8	2.94
528	534.30	8.81	0.877	25198.2	2.95	580	585.74	8.03	0.741	30177.1	2.94
529	535.29	8.79	0.878	25298.4	2.95	581	586.73	8.01	0.742	30268.3	2.94
530	536.28	8.77	0.880	25398.4	2.95	582	587.72	8.00	0.743	30359.3	2.94
531	537.26	8.76	0.881	25498.2	2.95	583	588.71	7.99	0.744	30441.6	2.93
532	538.25	8.74	0.882	25597.8	2.95	584	589.70	7.97	0.745	30523.4	2.93
533	539.24	8.73	0.884	25697.3	2.95	585	590.69	7.96	0.746	30605.1	2.93
534	540.23	8.71	0.885	25796.5	2.95	586	591.68	7.95	0.747	30686.6	2.93
535	541.22	8.69	0.886	25895.7	2.95	587	592.67	7.93	0.748	30767.9	2.93
536	542.21	8.68	0.887	25994.6	2.95	588	593.66	7.92	0.749	30849.0	2.92
537	543.19	8.66	0.889	26093.4	2.95	589	594.65	7.91	0.750	30930.0	2.92
538	544.18	8.65	0.890	26192.0	2.95	590	595.64	7.89	0.751	31010.8	2.92
539	545.17	8.63	0.891	26290.4	2.96	591	596.63	7.88	0.752	31091.5	2.92
540	546.16	8.61	0.893	26388.7	2.96	592	597.62	7.87	0.753	31172.0	2.92
541	547.15	8.60	0.894	26486.7	2.96	593	598.62	7.85	0.754	31252.3	2.91
542	548.14	8.58	0.895	26584.6	2.96	594	599.61	7.84	0.755	31332.5	2.91
543	549.13	8.57	0.897	26682.4	2.96	595	600.60	7.83	0.756	31412.5	2.91
544	550.12	8.55	0.898	26779.9	2.96	596	601.59	7.81	0.757	31492.4	2.91
545	551.10	8.54	0.899	26877.3	2.96	597	602.58	7.80	0.758	31572.0	2.91
546	552.09	8.52	0.900	26974.6	2.96	598	603.57	7.79	0.759	31651.6	2.90
547	553.08	8.51	0.902	27071.6	2.96	599	604.56	7.78	0.760	31730.9	2.90
548	554.07	8.49	0.903	27168.5	2.96	600	605.55	7.76	0.761	31810.1	2.90
549	555.06	8.47	0.904	27265.2	2.96	601	606.54	7.75	0.761	31889.2	2.90
550	556.05	8.46	0.905	27361.7	2.96	602	607.53	7.74	0.762	31968.1	2.89
551	557.04	8.44	0.907	27458.0	2.96	603	608.52	7.73	0.763	32046.8	2.89
552	558.03	8.43	0.908	27554.2	2.96	604	609.51	7.71	0.764	32125.3	2.89
553	559.02	8.41	0.909	27650.2	2.96	605	610.50	7.70	0.765	32203.7	2.89
554	560.01	8.40	0.910	27746.1	2.96	606	611.50	7.69	0.766	32282.0	2.88
555	561.00	8.38	0.911	27841.7	2.96	607	612.49	7.68	0.767	32360.1	2.88
556	561.99	8.37	0.913	27937.2	2.96	608	613.48	7.66	0.768	32438.0	2.88
557	562.97	8.35	0.914	28032.5	2.96	609	614.47	7.65	0.769	32515.8	2.88
558	563.96	8.34	0.915	28127.6	2.95	610	615.46	7.64	0.770	32593.4	2.87
559	564.95	8.33	0.916	28222.6	2.95	611	616.45	7.63	0.771	32670.8	2.87

617	622.40	7.55	0.776	33132.3	2.86	669	673.98	6.97	0.819	36875.9	2.71
618	623.39	7.54	0.777	33206.6	2.85	670	674.97	6.96	0.819	36934.4	2.71
619	624.38	7.53	0.778	33284.8	2.85	671	675.97	6.95	0.820	36992.7	2.70
620	625.37	7.52	0.779	33360.9	2.85	672	676.96	6.94	0.821	37051.0	2.70
621	626.36	7.50	0.780	33436.8	2.85	673	677.95	6.93	0.821	37109.1	2.70
622	627.36	7.49	0.781	33512.5	2.84	674	678.95	6.92	0.822	37167.0	2.69
623	628.35	7.48	0.781	33588.1	2.84	675	679.94	6.91	0.823	37224.9	2.69
624	629.34	7.47	0.782	33663.5	2.84	676	680.93	6.90	0.823	37282.6	2.69
625	630.33	7.46	0.783	33738.8	2.84	677	681.92	6.89	0.824	37340.2	2.68
626	631.32	7.44	0.784	33814.0	2.83	678	682.92	6.88	0.825	37397.7	2.68
627	632.31	7.43	0.785	33888.9	2.83	679	683.91	6.87	0.825	37455.1	2.68
628	633.31	7.42	0.786	33963.8	2.83	680	684.90	6.86	0.826	37512.3	2.67
629	634.30	7.41	0.787	34038.4	2.83	681	685.90	6.85	0.826	37569.5	2.67
630	635.29	7.40	0.788	34113.0	2.82	682	686.89	6.84	0.827	37626.5	2.66
631	636.28	7.39	0.788	34187.3	2.82	683	687.88	6.83	0.828	37683.3	2.66
632	637.27	7.37	0.789	34261.5	2.82	684	688.87	6.82	0.828	37740.1	2.66
633	638.26	7.36	0.790	34335.6	2.82	685	689.87	6.81	0.829	37796.7	2.65
634	639.26	7.35	0.791	34409.5	2.81	686	690.86	6.80	0.830	37853.2	2.65
635	640.25	7.34	0.792	34483.3	2.81	687	691.85	6.79	0.830	37909.6	2.65
636	641.24	7.33	0.793	34556.9	2.81	688	692.85	6.78	0.831	37965.9	2.64
637	642.23	7.32	0.794	34630.4	2.81	689	693.84	6.77	0.831	38022.1	2.64
638	643.22	7.31	0.794	34703.7	2.80	690	694.83	6.76	0.832	38078.1	2.64
639	644.21	7.29	0.795	34776.9	2.80	691	695.82	6.75	0.833	38134.0	2.63
640	645.21	7.28	0.796	34849.9	2.80	692	696.82	6.74	0.833	38189.8	2.63
641	646.20	7.27	0.797	34922.8	2.79	693	697.81	6.73	0.834	38245.5	2.62
642	647.19	7.26	0.798	34995.5	2.79	694	698.80	6.72	0.834	38301.1	2.62
643	648.18	7.25	0.798	35068.1	2.79	695	699.80	6.71	0.835	38356.5	2.62
644	649.17	7.24	0.799	35140.5	2.79	696	700.79	6.70	0.836	38411.8	2.61
645	650.17	7.23	0.800	35212.8	2.78	697	701.78	6.69	0.836	38467.1	2.61
646	651.16	7.22	0.801	35284.9	2.78	698	702.78	6.68	0.837	38522.1	2.61
647	652.15	7.21	0.802	35356.9	2.78	699	703.77	6.67	0.837	38577.1	2.60
648	653.14	7.19	0.803	35428.8	2.77	700	704.76	6.67	0.838	38632.0	2.60
649	654.13	7.18	0.803	35500.5	2.77	701	705.76	6.66	0.839	38686.7	2.59
650	655.13	7.17	0.804	35572.1	2.77	702	706.75	6.65	0.839	38741.4	2.59
651	656.12	7.16	0.805	35643.5	2.77	703	707.74	6.64	0.840	38795.9	2.59
652	657.11	7.15	0.806	35714.7	2.76	704	708.74	6.63	0.840	38850.1	2.58
653	658.10	7.14	0.807	35785.9	2.76	705	709.73	6.62	0.841	38904.6	2.58
654	659.10	7.13	0.807	35856.6	2.76	706	710.72	6.61	0.842	38958.7	2.58
655	660.09	7.12	0.808	35927.7	2.75	707	711.72	6.60	0.842	39012.8	2.57
656	661.08	7.11	0.809	35998.4	2.75	708	712.71	6.59	0.843	39066.7	2.57
657	662.07	7.10	0.810	36068.9	2.75	709	713.70	6.58	0.843	39120.6	2.57
658	663.07	7.09	0.811	36139.3	2.75	710	714.70	6.57	0.844	39174.3	2.56
659	664.06	7.08	0.811	36209.6	2.74	711	715.69	6.56	0.845	39227.9	2.56
660	665.05	7.07	0.812	36279.7	2.74	712	716.68	6.55	0.845	39281.4	2.56
661	666.04	7.05	0.813	36349.7	2.74	713	717.68	6.54	0.846	39334.8	2.55
662	667.03	7.04	0.814	36419.6	2.73	714	718.67	6.54	0.846	39388.1	2.55
663	668.03	7.03	0.815	36489.3	2.73	715	719.66	6.53	0.847	39441.2	2.54
664	669.02	7.02	0.815	36558.8	2.73	716	720.66	6.52	0.847	39494.3	2.54
665	670.01	7.01	0.816	36628.3	2.73	717	721.65	6.51	0.848	39547.2	2.54
666	671.00	7.00	0.817	36697.5	2.72	718	722.64	6.50	0.849	39600.0	2.53
667	672.00	6.99	0.818	36758.5	2.72	719	723.64	6.49	0.849	39652.8	2.53
668	672.99	6.98	0.818	36817.3	2.72	720	724.63	6.48	0.850	39705.4	2.53

Hatfield Dawson Consulting Engineers

Hatfield Dawson Consulting Engineers

721	725.63	6.47	0.850	39757.9	2.52	773	777.32	6.04	0.877	42344.5	2.34
722	726.62	6.46	0.851	39810.3	2.52	774	778.31	6.03	0.878	42391.6	2.34
723	727.61	6.45	0.851	39862.6	2.52	775	779.30	6.03	0.878	42438.6	2.33
724	728.61	6.45	0.852	39914.7	2.51	776	780.30	6.02	0.879	42485.6	2.33
725	729.60	6.44	0.852	39966.8	2.51	777	781.29	6.01	0.879	42532.4	2.33
726	730.59	6.43	0.853	40018.8	2.50	778	782.29	6.00	0.880	42579.2	2.32
727	731.59	6.42	0.854	40070.6	2.50	779	783.28	5.99	0.880	42619.9	2.32
728	732.58	6.41	0.854	40122.3	2.50	780	784.28	5.99	0.881	42658.3	2.32
729	733.57	6.40	0.855	40174.0	2.49	781	785.27	5.98	0.881	42696.7	2.31
730	734.57	6.39	0.855	40225.5	2.49	782	786.27	5.97	0.881	42734.9	2.31
731	735.56	6.38	0.856	40276.9	2.49	783	787.26	5.96	0.882	42773.1	2.31
732	736.56	6.38	0.856	40328.3	2.48	784	788.26	5.96	0.882	42811.2	2.30
733	737.55	6.37	0.857	40379.5	2.48	785	789.25	5.95	0.883	42849.3	2.30
734	738.54	6.36	0.857	40430.6	2.48	786	790.25	5.94	0.883	42887.2	2.29
735	739.54	6.35	0.858	40481.6	2.47	787	791.24	5.93	0.883	42925.1	2.29
736	740.53	6.34	0.858	40532.5	2.47	788	792.23	5.93	0.884	42962.9	2.29
737	741.53	6.33	0.859	40583.3	2.47	789	793.23	5.92	0.884	43000.6	2.28
738	742.52	6.32	0.860	40634.0	2.46	790	794.22	5.91	0.885	43038.2	2.28
739	743.51	6.32	0.860	40684.5	2.46	791	795.22	5.90	0.885	43075.8	2.28
740	744.51	6.31	0.861	40735.0	2.45	792	796.21	5.90	0.885	43113.2	2.27
741	745.50	6.30	0.861	40785.4	2.45	793	797.21	5.89	0.886	43150.6	2.27
742	746.50	6.29	0.862	40835.7	2.45	794	798.20	5.88	0.886	43188.0	2.26
743	747.49	6.28	0.862	40885.8	2.44	795	799.20	5.87	0.887	43225.2	2.26
744	748.48	6.27	0.863	40935.9	2.44	796	800.19	5.87	0.887	43262.4	2.26
745	749.48	6.27	0.863	40985.9	2.44	797	801.19	5.86	0.887	43299.5	2.25
746	750.47	6.26	0.864	41035.7	2.43	798	802.18	5.85	0.888	43336.5	2.25
747	751.47	6.25	0.864	41085.5	2.43	799	803.18	5.85	0.888	43373.4	2.25
748	752.46	6.24	0.865	41135.2	2.43	800	804.17	5.84	0.888	43410.3	2.24
749	753.45	6.23	0.865	41184.7	2.42	801	805.17	5.83	0.889	43447.1	2.24
750	754.45	6.22	0.866	41234.2	2.42	802	806.16	5.82	0.889	43483.8	2.24
751	755.44	6.22	0.866	41283.5	2.42	803	807.16	5.82	0.890	43520.5	2.23
752	756.44	6.21	0.867	41332.8	2.41	804	808.15	5.81	0.890	43557.0	2.23
753	757.43	6.20	0.867	41381.9	2.41	805	809.15	5.80	0.890	43593.5	2.22
754	758.42	6.19	0.868	41431.0	2.41	806	810.14	5.80	0.891	43629.9	2.22
755	759.42	6.18	0.868	41480.0	2.40	807	811.14	5.79	0.891	43666.3	2.22
756	760.41	6.18	0.869	41528.8	2.40	808	812.13	5.78	0.891	43702.5	2.21
757	761.41	6.17	0.869	41577.6	2.40	809	813.12	5.77	0.892	43738.7	2.21
758	762.40	6.16	0.870	41626.2	2.39	810	814.12	5.77	0.892	43774.9	2.21
759	763.40	6.15	0.870	41674.8	2.39	811	815.11	5.76	0.893	43810.9	2.20
760	764.39	6.14	0.871	41723.3	2.39	812	816.11	5.75	0.893	43846.9	2.20
761	765.38	6.14	0.871	41771.6	2.38	813	817.10	5.75	0.893	43882.8	2.20
762	766.38	6.13	0.872	41819.9	2.38	814	818.10	5.74	0.894	43918.6	2.19
763	767.37	6.12	0.872	41868.1	2.38	815	819.09	5.73	0.894	43954.4	2.19
764	768.37	6.11	0.873	41916.2	2.37	816	820.09	5.72	0.894	43990.1	2.19
765	769.36	6.10	0.873	41964.1	2.37	817	821.08	5.72	0.895	44025.7	2.18
766	770.36	6.10	0.874	42012.0	2.37	818	822.08	5.71	0.895	44061.2	2.18
767	771.35	6.09	0.874	42059.8	2.36	819	823.07	5.70	0.895	44096.7	2.17
768	772.34	6.08	0.875	42107.5	2.36	820	824.07	5.70	0.896	44132.1	2.17
769	773.34	6.07	0.875	42155.1	2.35	821	825.06	5.69	0.896	44167.4	2.17
770	774.33	6.06	0.876	42202.6	2.35	822	826.06	5.68	0.896	44202.7	2.16
771	775.33	6.06	0.876	42250.0	2.35	823	827.06	5.68	0.897	44237.8	2.16
772	776.32	6.05	0.877	42297.3	2.34	824	828.05	5.67	0.897	44273.0	2.16

825	829.05	5.66	0.898	44308.0	2.15	877	880.81	5.33	0.915	46038.1	1.98
826	830.04	5.66	0.898	44343.0	2.15	878	881.80	5.32	0.915	46069.6	1.98
827	831.04	5.65	0.898	44377.9	2.15	879	882.80	5.32	0.916	46101.2	1.98
828	832.03	5.64	0.899	44412.7	2.14	880	883.79	5.31	0.916	46132.6	1.97
829	833.03	5.64	0.899	44447.5	2.14	881	884.79	5.30	0.916	46164.0	1.97
830	834.02	5.63	0.899	44482.2	2.14	882	885.79	5.30	0.916	46195.4	1.97
831	835.02	5.62	0.900	44516.8	2.13	883	886.78	5.29	0.917	46226.7	1.96
832	836.01	5.62	0.900	44551.4	2.13	884	887.78	5.29	0.917	46257.9	1.96
833	837.01	5.61	0.900	44585.8	2.13	885	888.77	5.28	0.917	46289.0	1.96
834	838.00	5.60	0.901	44620.3	2.12	886	889.77	5.27	0.918	46320.1	1.95
835	839.00	5.60	0.901	44654.6	2.12	887	890.76	5.27	0.918	46351.2	1.95
836	839.99	5.59	0.901	44688.9	2.12	888	891.76	5.26	0.918	46382.2	1.95
837	840.99	5.58	0.902	44723.1	2.11	889	892.76	5.26	0.919	46413.1	1.95
838	841.98	5.58	0.902	44757.3	2.11	890	893.75	5.25	0.919	46444.0	1.94
839	842.98	5.57	0.902	44791.3	2.11	891	894.75	5.25	0.919	46474.8	1.94
840	843.97	5.56	0.903	44825.3	2.10	892	895.74	5.24	0.920	46505.5	1.94
841	844.97	5.56	0.903	44859.3	2.10	893	896.74	5.23	0.920	46536.2	1.93
842	845.96	5.55	0.903	44893.2	2.10	894	897.73	5.23	0.920	46566.9	1.93
843	846.96	5.54	0.904	44927.0	2.09	895	898.73	5.22	0.920	46597.5	1.93
844	847.95	5.54	0.904	44960.7	2.09	896	899.73	5.22	0.921	46628.0	1.92
845	848.95	5.53	0.904	44994.4	2.09	897	900.72	5.21	0.921	46658.4	1.92
846	849.95	5.52	0.905	45028.0	2.08	898	901.72	5.20	0.921	46688.8	1.92
847	850.94	5.52	0.905	45061.6	2.08	899	902.71	5.20	0.922	46719.2	1.92
848	851.94	5.51	0.905	45095.0	2.08	900	903.71	5.19	0.922	46749.5	1.91
849	852.93	5.50	0.906	45128.4	2.07	901	904.71	5.19	0.922	46779.7	1.91
850	853.93	5.50	0.906	45161.8	2.07	902	905.70	5.18	0.923	46809.9	1.91
851	854.92	5.49	0.906	45195.1	2.07	903	906.70	5.18	0.923	46840.0	1.90
852	855.92	5.48	0.907	45228.3	2.06	904	907.69	5.17	0.923	46870.1	1.90
853	856.91	5.48	0.907	45261.4	2.06	905	908.69	5.16	0.923	46900.1	1.90
854	857.91	5.47	0.907	45294.5	2.06	906	909.69	5.16	0.924	46930.1	1.89
855	858.90	5.46	0.908	45327.6	2.05	907	910.68	5.15	0.924	46959.9	1.89
856	859.90	5.46	0.908	45360.5	2.05	908	911.68	5.15	0.924	46989.8	1.89
857	860.90	5.45	0.908	45393.4	2.05	909	912.67	5.14	0.925	47019.6	1.89
858	861.89	5.45	0.909	45426.2	2.04	910	913.67	5.14	0.925	47049.3	1.88
859	862.89	5.44	0.909	45459.0	2.04	911	914.67	5.13	0.925	47079.0	1.88
860	863.88	5.43	0.909	45491.7	2.04	912	915.66	5.13	0.925	47108.6	1.88
861	864.88	5.43	0.910	45524.3	2.03	913	916.66	5.12	0.926	47138.2	1.87
862	865.87	5.42	0.910	45556.9	2.03	914	917.65	5.11	0.926	47167.7	1.87
863	866.87	5.41	0.910	45589.4	2.03	915	918.65	5.11	0.926	47197.1	1.87
864	867.86	5.41	0.911	45621.9	2.02	916	919.65	5.10	0.927	47226.5	1.87
865	868.86	5.40	0.911	45654.3	2.02	917	920.64	5.10	0.927	47255.9	1.86
866	869.85	5.40	0.911	45686.6	2.02	918	921.64	5.09	0.927	47285.2	1.86
867	870.85	5.39	0.912	45718.8	2.01	919	922.63	5.09	0.928	47314.4	1.86
868	871.85	5.38	0.912	45751.0	2.01	920	923.63	5.08	0.928	47343.6	1.85
869	872.84	5.38	0.912	45783.2	2.01	921	924.63	5.08	0.928	47372.7	1.85
870	873.84	5.37	0.913	45815.3	2.00	922	925.62	5.07	0.928	47401.8	1.85
871	874.83	5.37	0.913	45847.3	2.00	923	926.62	5.06	0.929	47430.8	1.85
872	875.83	5.36	0.913	45879.2	2.00	924	927.61	5.06	0.929	47459.8	1.84
873	876.82	5.35	0.914	45911.1	2.00	925	928.61	5.05	0.929	47488.7	1.84
874	877.82	5.35	0.914	45942.9	1.99	926	929.61	5.05	0.929	47517.6	1.84
875	878.82	5.34	0.914	45974.7	1.99	927	930.60	5.04	0.930	47546.4	1.83
876	879.81	5.33	0.915	46006.4	1.99	928	931.60	5.04	0.930	47575.1	1.83

Hatfield Dawson Consulting Engineers

Hatfield Dawson Consulting Engineers

929	932.59	5.03	0.930	47603.8	1.83	981	984.40	4.77	0.941	48688.1	1.68
930	933.59	5.03	0.931	47632.5	1.83	982	985.40	4.76	0.941	48707.1	1.68
931	934.59	5.02	0.931	47661.1	1.82	983	986.40	4.76	0.941	48726.1	1.67
932	935.58	5.02	0.931	47689.6	1.82	984	987.39	4.75	0.941	48745.1	1.67
933	936.58	5.01	0.931	47718.1	1.82	985	988.39	4.75	0.942	48764.0	1.67
934	937.58	5.01	0.932	47746.5	1.81	986	989.39	4.74	0.942	48782.8	1.66
935	938.57	5.00	0.932	47774.8	1.81	987	990.38	4.74	0.942	48801.6	1.66
936	939.57	4.99	0.932	47795.5	1.81	988	991.38	4.73	0.942	48820.4	1.66
937	940.56	4.99	0.932	47816.1	1.81	989	992.38	4.73	0.942	48839.2	1.66
938	941.56	4.98	0.933	47836.8	1.80	990	993.37	4.72	0.943	48857.9	1.65
939	942.56	4.98	0.933	47857.4	1.80	991	994.37	4.72	0.943	48876.6	1.65
940	943.55	4.97	0.933	47877.9	1.80	992	995.37	4.71	0.943	48895.3	1.65
941	944.55	4.97	0.933	47898.4	1.79	993	996.36	4.71	0.943	48913.9	1.65
942	945.54	4.96	0.933	47918.9	1.79	994	997.36	4.70	0.943	48932.5	1.64
943	946.54	4.96	0.934	47939.3	1.79	995	998.36	4.70	0.943	48951.1	1.64
944	947.54	4.95	0.934	47959.7	1.78	996	999.35	4.70	0.944	48969.6	1.64
945	948.53	4.95	0.934	47980.1	1.78	997	1000.35	4.69	0.944	48988.1	1.64
946	949.53	4.94	0.934	48000.4	1.78	998	1001.35	4.69	0.944	49006.6	1.63
947	950.53	4.94	0.934	48020.7	1.78	999	1002.34	4.68	0.944	49025.0	1.63
948	951.52	4.93	0.935	48040.9	1.77	1000	1003.34	4.68	0.944	49043.4	1.63
949	952.52	4.93	0.935	48061.1	1.77						
950	953.52	4.92	0.935	48081.3	1.77						
951	954.51	4.92	0.935	48101.4	1.76						
952	955.51	4.91	0.935	48121.5	1.76						
953	956.50	4.91	0.936	48141.6	1.76						
954	957.50	4.90	0.936	48161.6	1.76						
955	958.50	4.90	0.936	48181.6	1.75						
956	959.49	4.89	0.936	48201.5	1.75						
957	960.49	4.89	0.936	48221.4	1.75						
958	961.49	4.88	0.937	48241.3	1.74						
959	962.48	4.88	0.937	48261.1	1.74						
960	963.48	4.87	0.937	48280.9	1.74						
961	964.48	4.87	0.937	48300.6	1.73						
962	965.47	4.86	0.937	48320.4	1.73						
963	966.47	4.86	0.938	48340.0	1.73						
964	967.46	4.85	0.938	48359.7	1.73						
965	968.46	4.85	0.938	48379.3	1.72						
966	969.46	4.84	0.938	48398.9	1.72						
967	970.45	4.84	0.938	48418.4	1.72						
968	971.45	4.83	0.938	48437.9	1.71						
969	972.45	4.83	0.939	48457.4	1.71						
970	973.44	4.82	0.939	48476.8	1.71						
971	974.44	4.82	0.939	48496.2	1.71						
972	975.44	4.81	0.939	48515.5	1.70						
973	976.43	4.81	0.939	48534.9	1.70						
974	977.43	4.80	0.940	48554.1	1.70						
975	978.43	4.80	0.940	48573.4	1.70						
976	979.42	4.79	0.940	48592.6	1.69						
977	980.42	4.79	0.940	48611.8	1.69						
978	981.41	4.78	0.940	48630.9	1.69						
979	982.41	4.78	0.941	48650.0	1.68						
980	983.41	4.77	0.941	48669.1	1.68						

Hatfield Dawson Consulting Engineers

Hatfield Dawson Consulting Engineers