

CEEn-2017CPST-001

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Structural & Geotechnical Report

# ARROWHEAD CENTER

KADD Engineering

Austin Burton

Kendl Hansen

David Davies

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# Introduction

## Project Overview:

- Under the direction of Fritz Realty, we were tasked with the analysis of the existing structure and surrounding plot of land for the Arrowhead Center in Spanish Fork. We determined what structural and geotechnical studies would be needed.

## Structural Overview:

- The existing structure should be analyzed to determine if it meets the standard of the existing building code (IBC 2015).
- Unreinforced masonry walls should be retrofit to resist seismic loads.
- Wood members with visible splits or water damage should be analyzed to determine adequacy.
- Retrofitted areas and damaged columns should be analyzed to determine adequacy.



## Geotechnical Overview:

- Geotechnical reports were provided for the plots shown to the left.
- It was determined that Plot 1 is located in a floodplain and precautionary measures will need to be undertaken, such as perimeter drainage.
- The soil for Plots 2-4 are adequate to support residential structures and will not need to be altered.
- Structures built on Plot 1 with bearing pressure in excess of 1,500 psf should be constructed on compacted fill.



# Existing Conditions

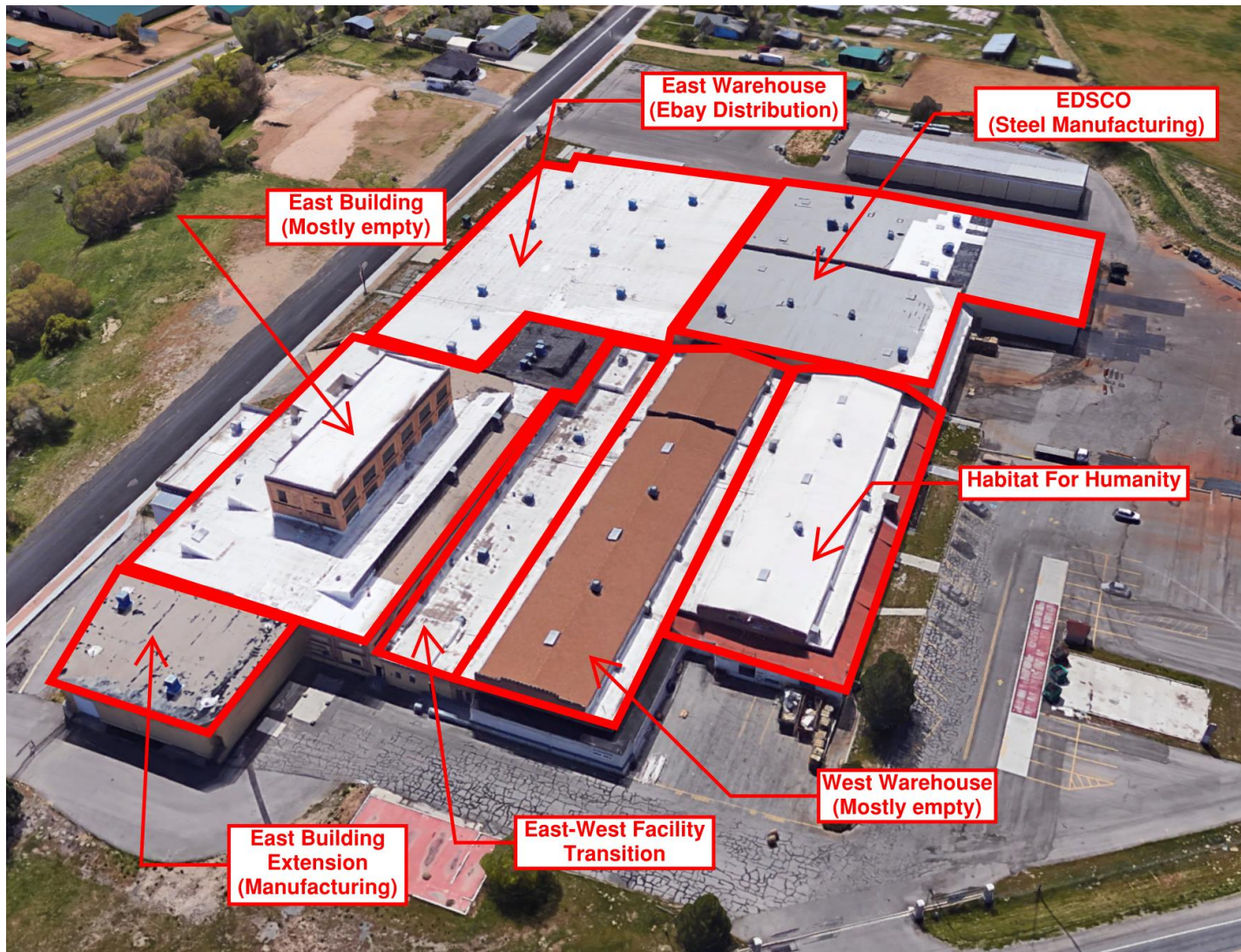






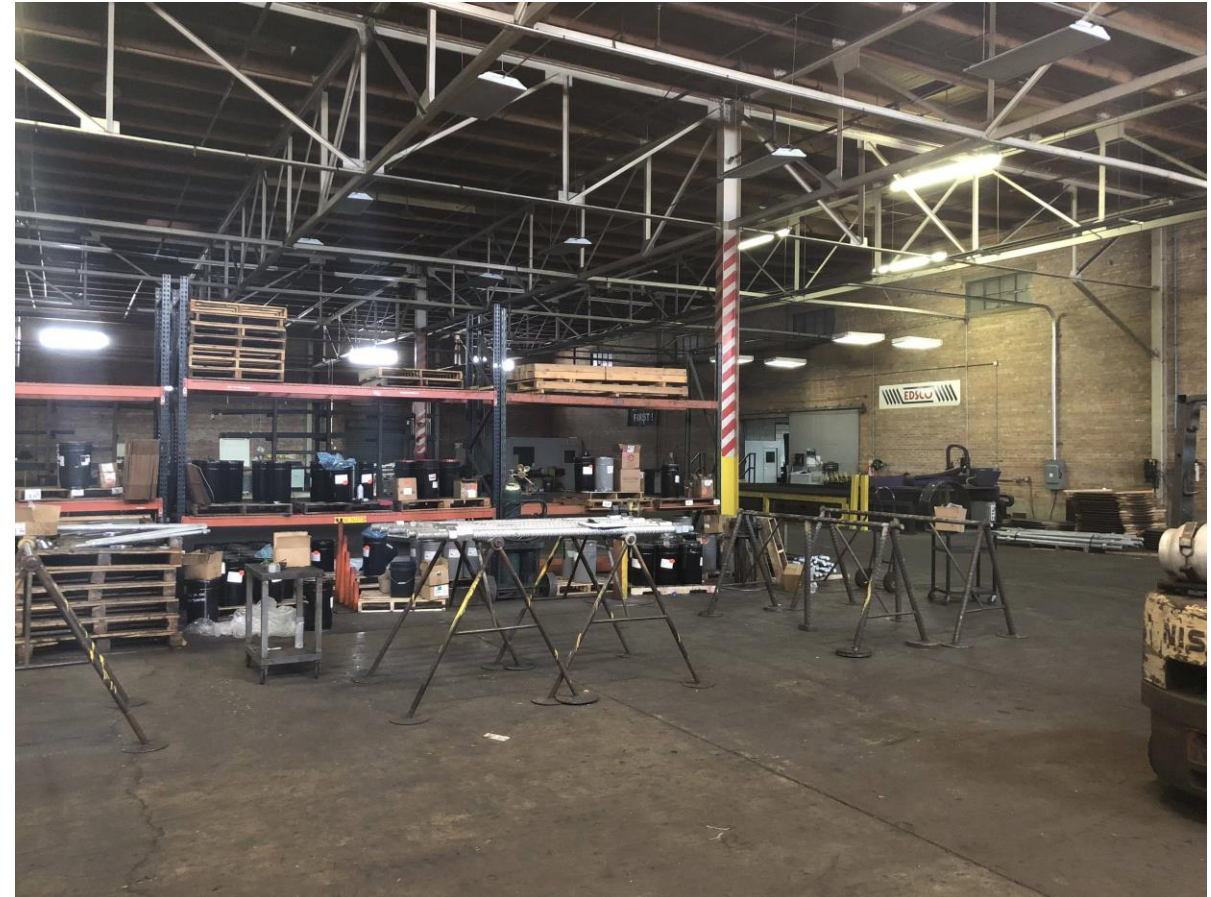


# Building Layout (EDSCO)



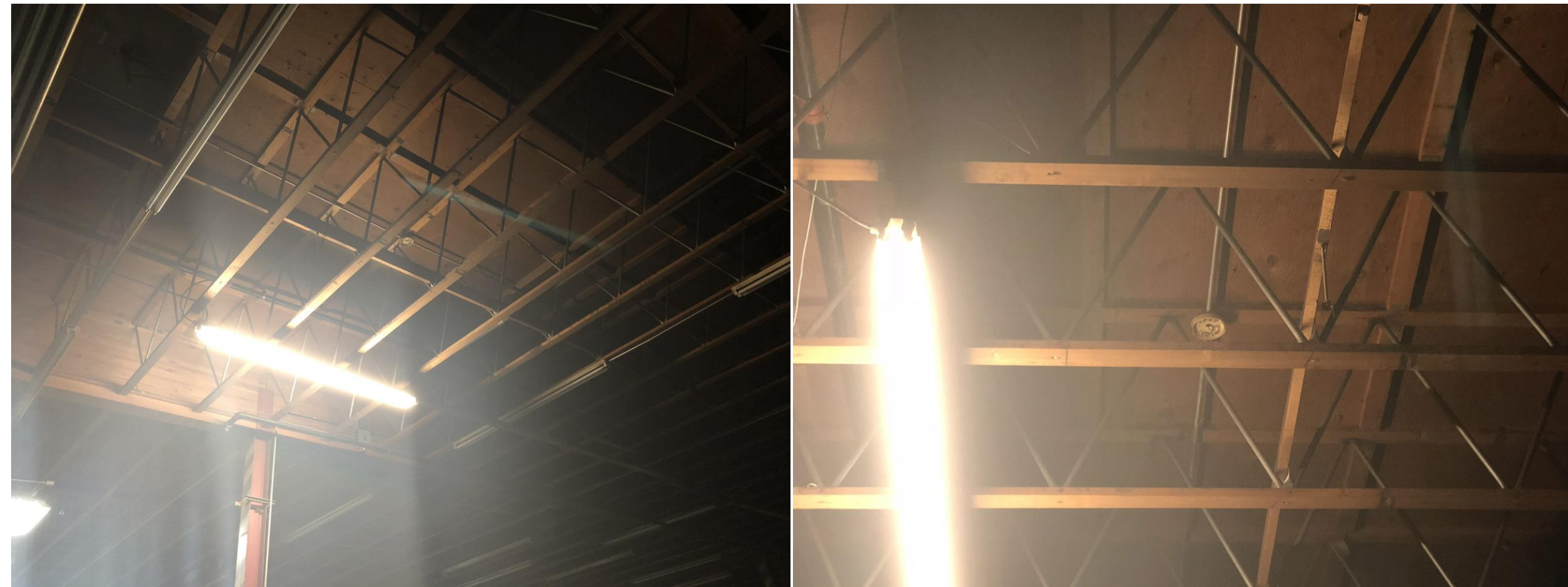


## EDSCO (Steel Manufacturing)





## EDSCO (Open web truss roof)



# EDSCO (Open web truss roof)

## RED-L™ TRUSS ALLOWABLE UNIFORM LOAD TABLE (PLF) / PARALLEL CHORD

Continued from page 6

SEE PAGE 4 FOR ECONOMICAL TRUSS DESIGN

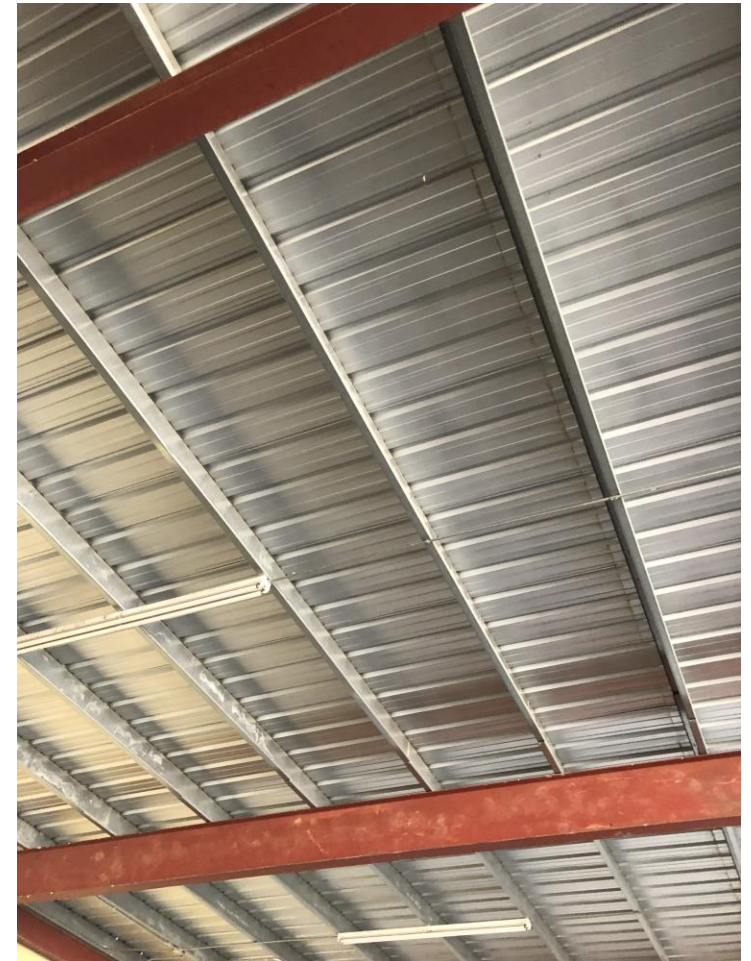
Snow Load	28	psf
Dead Load	10	psf
Total Load	38	psf
Roof Trib	3	ft
(TL)(Trib)	114	plf
Joist Capacity	129	plf

since  $TL < \text{Joist capacity}$ , the  
joists are sufficient

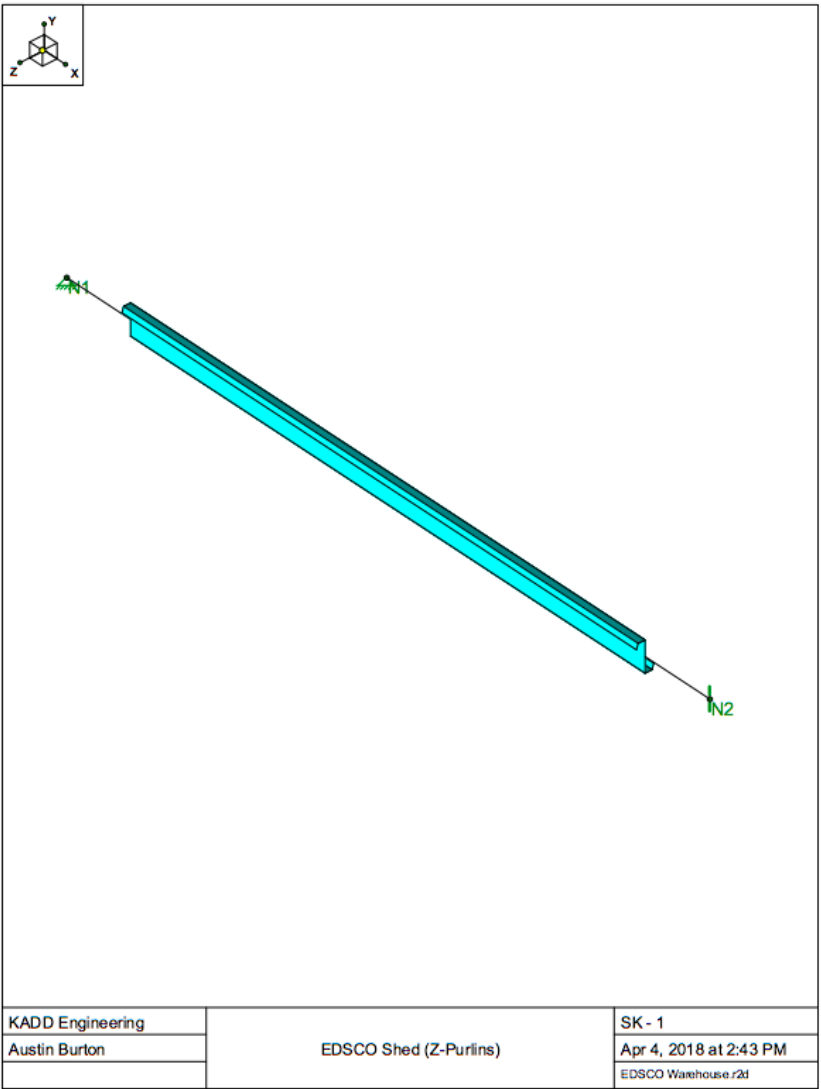
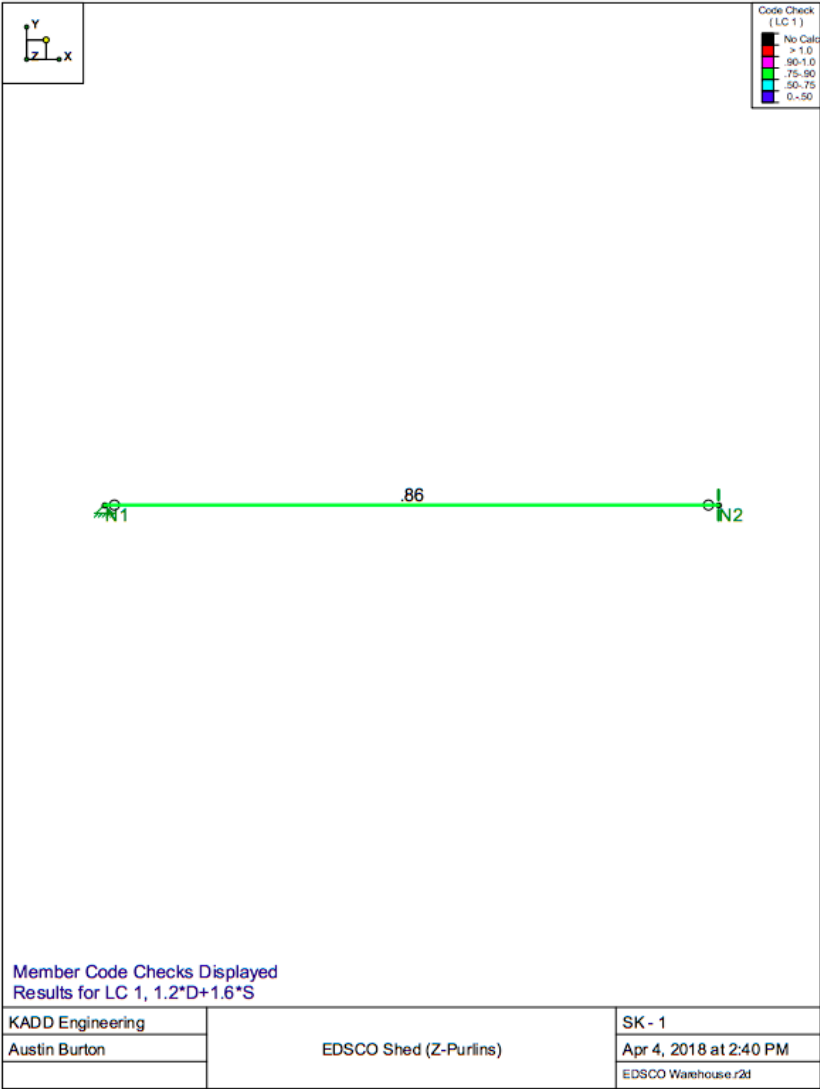
Span	Depth													
	28"		30"		32"		34"		36"		38"		40"	
	100% TL 100% LL	115% TL 125% TL	100% TL 100% LL	115% TL 125% TL	100% TL 100% LL	115% TL 125% TL	100% TL 100% LL	115% TL 125% TL	100% TL 100% LL	115% TL 125% TL	100% TL 100% LL	115% TL 125% TL	100% TL 100% LL	115% TL 125% TL
14'	307	354 375	296	338 371	291	333 357	275	315 343	262	304 329	264	305 328	244	280 304
16'	311	351 368	311	336 347	283	310 335	266	307 322	261	298 307	257	292 305	240	277 301
18'	278	308 340	276	315 345	276	303 304	261	289 315	258	280 303	252	280 287	235	268 304
20'	271	311 336	284	312 323	259	290 315	257	279 305	259	260 284	234	264 289	236	256 275
22'	260	305 325	263	287 316	238	279 301	236	259 282	241	258 281	224	256 278	224	238 259
24'	219	288 298	253	291 302	243	287 296	222	272 281	227	261 284	218	234 271	213	246 252
26'	195	270 275	237	272 276	237	272 272	228	266 276	222	256 278	222	255 266	212	232 250
28'	177	233 248	214	253 257	220	253 257	220	253 254	218	251 255	198	231 249	208	232 232
30'	164	208 226	172	219 238	200	237 241	206	236 242	204	236 239	206	219 231	205	218 219
32'	151	184 199	158	197 214	170	212 225	180	207 217	193	222 222	193	211 215	193	203 207
34'	137	162 176	147	174 186	157	187 204	165	199 210	181	208 208	182	200 200	182	190 190
36'	123	138 151	132	150 163	140	156 174	151	171 185	161	180 195	172	187 188	172	179 179
38'	113	116 135	115	134 147	127	144 157	136	152 167	144	163 177	152	162 180	163	171 172
40'	99	113 122	109	122 132	117	130 141	125	139 150	129	146 160	140	153 164	148	162 162
42'	92	102 112	99	108 120	107	117 128	114	125 136	121	133 145	128	141 153	133	147 150
44'	78	92 100	90	98 109	96	107 117	101	114 125	109	121 133	116	129 140	121	131 139
46'	76	84 93	82	92 100	86	98 106	93	105 114	99	112 121	105	118 128	112	124 131
48'	70	79 86	73	84 92	81	90 98	86	96 105	91	102 110	96	108 118	103	113 124
50'	72	70	69	78	71	83	80	89	85	94	90	100	95	105



## EDSCO Shed



# EDSCO Shed - Analysis of Z-Purlins



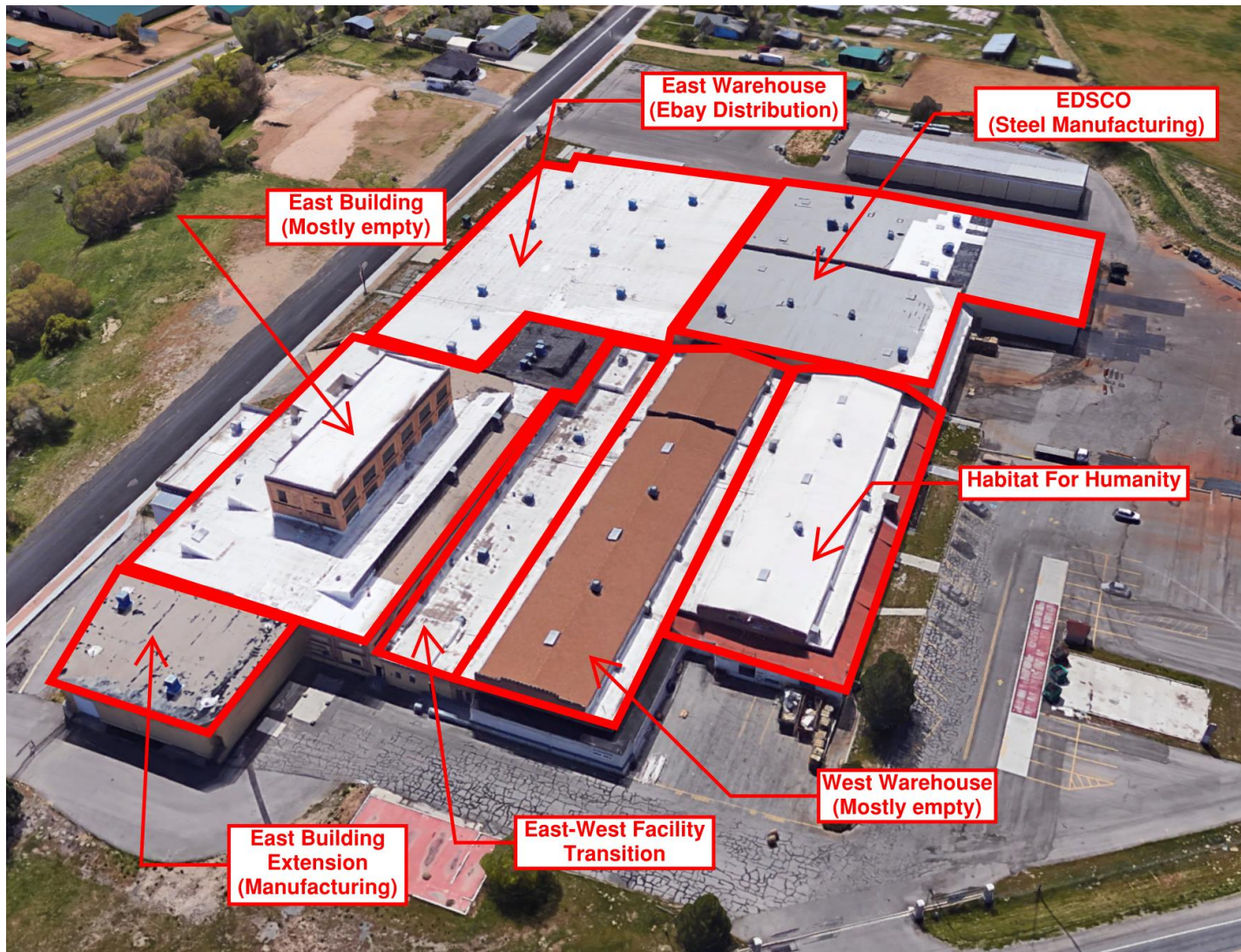


# Damaged Load Bearing Members



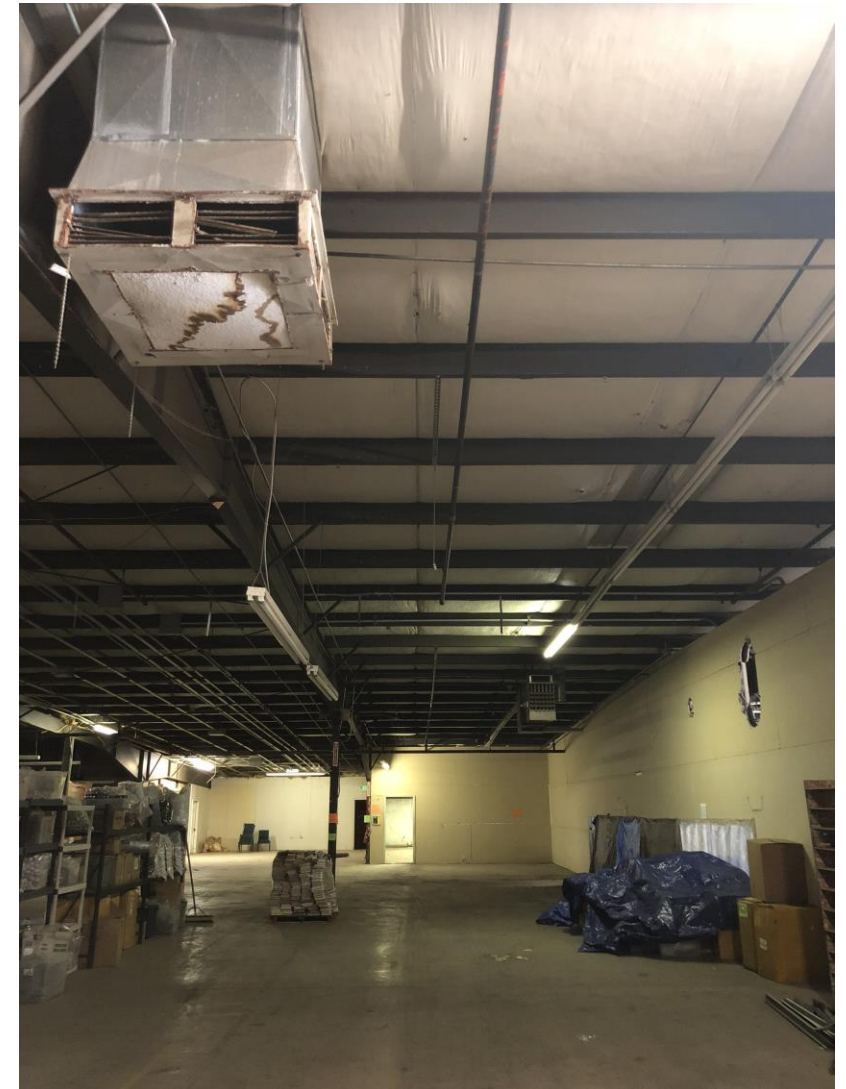


# Building Layout (Ebay)



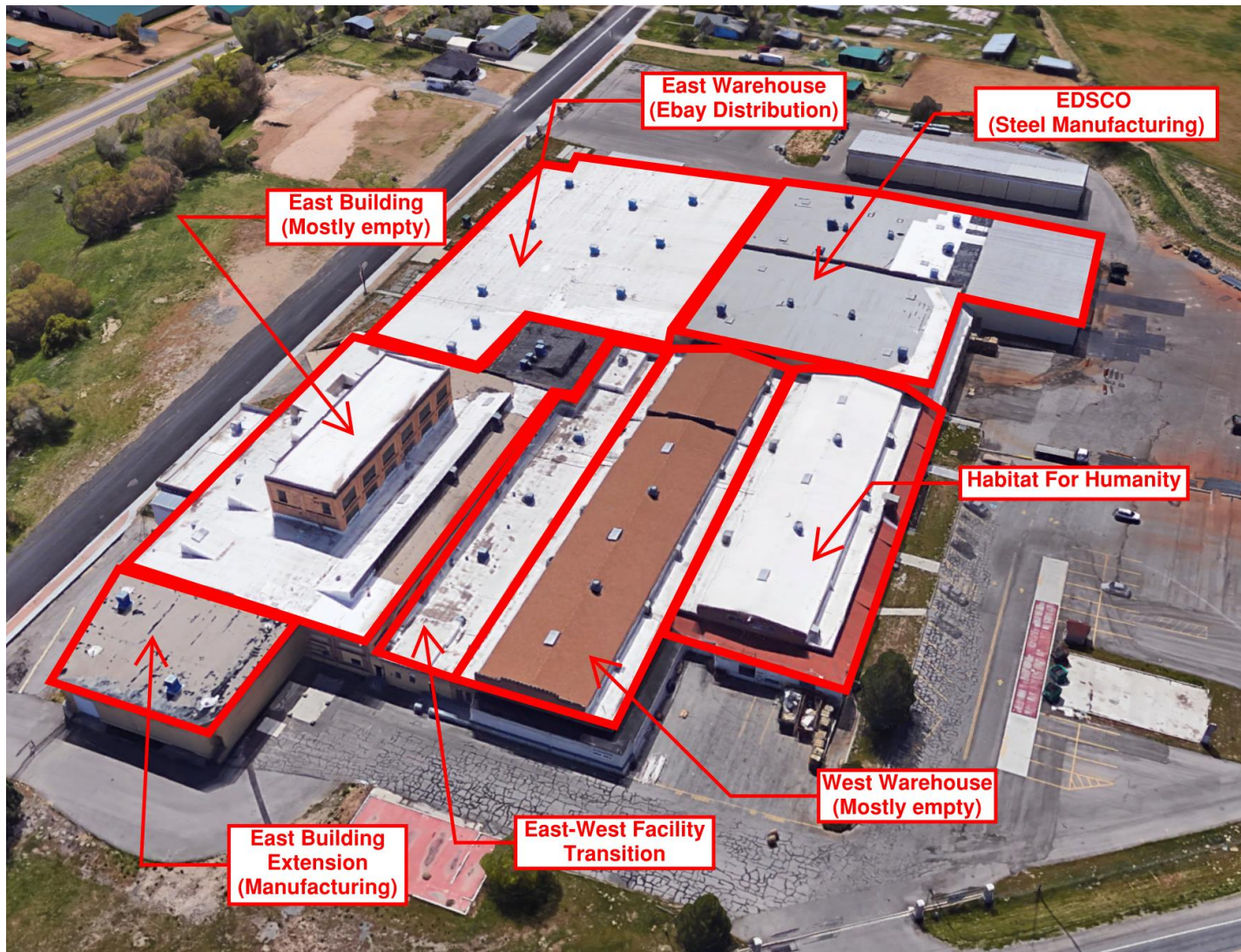


## East Warehouse (Ebay Book Distribution)



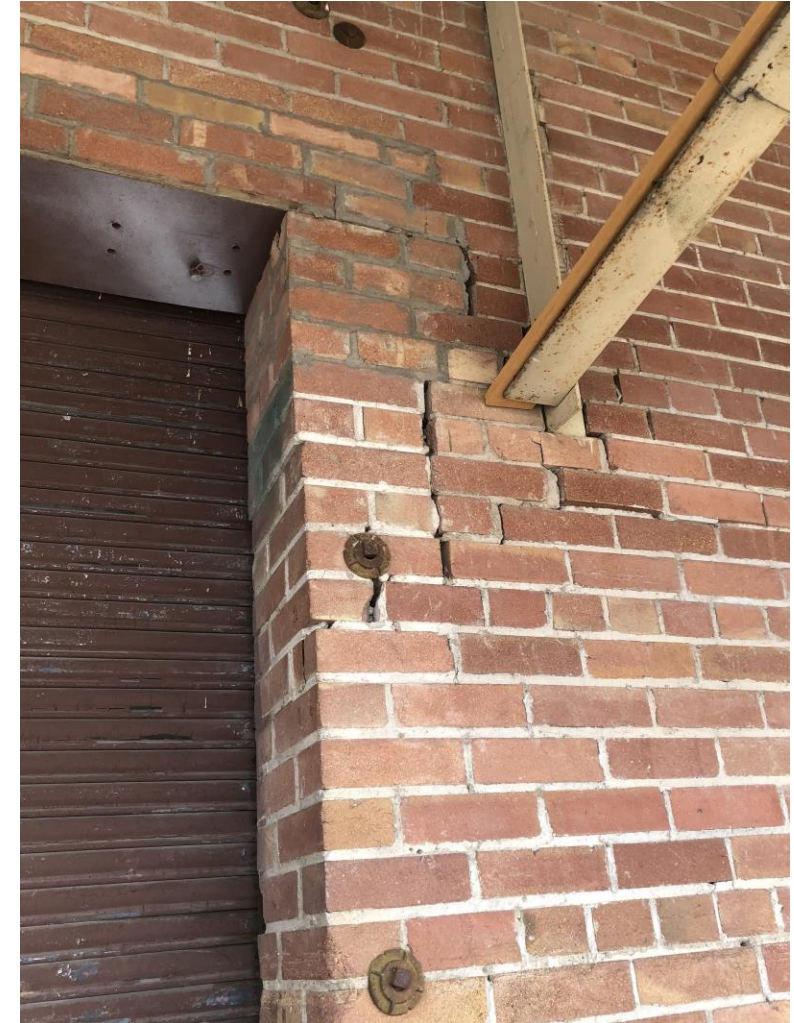


# Building Layout (Habitat For Humanity)





# Habitat For Humanity/West Warehouse





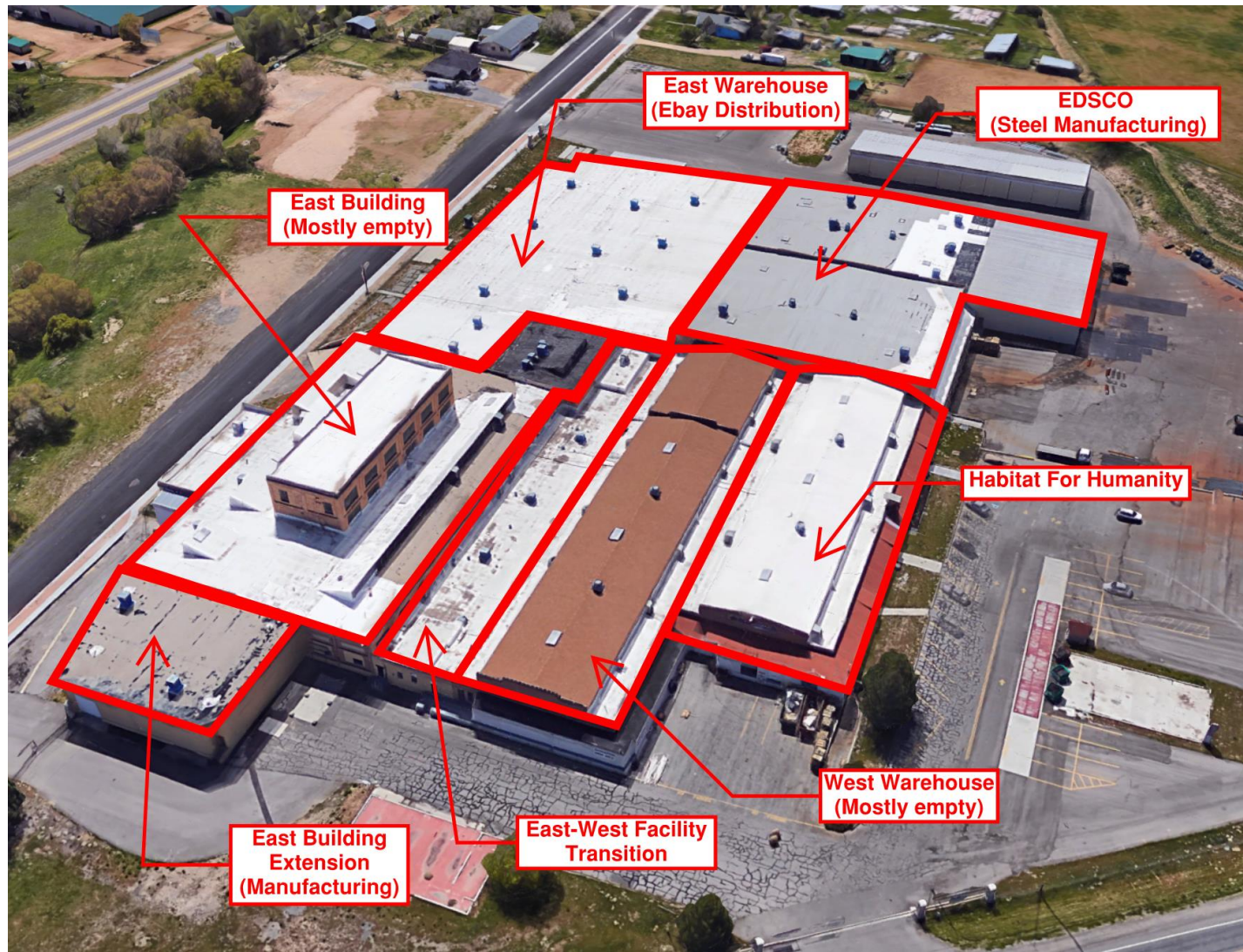
# Habitat For Humanity/West Warehouse

Displaced Column Retrofit



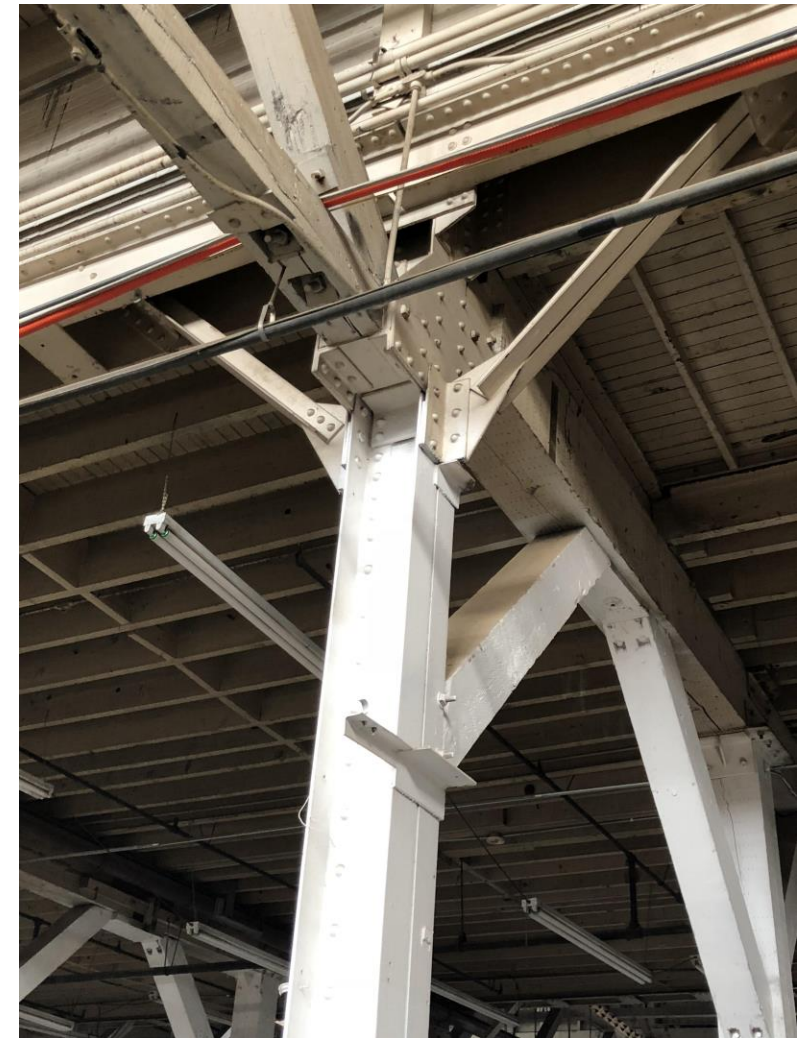


# Building Layout (East Building)





## East Building (Oldest Standing Structure)





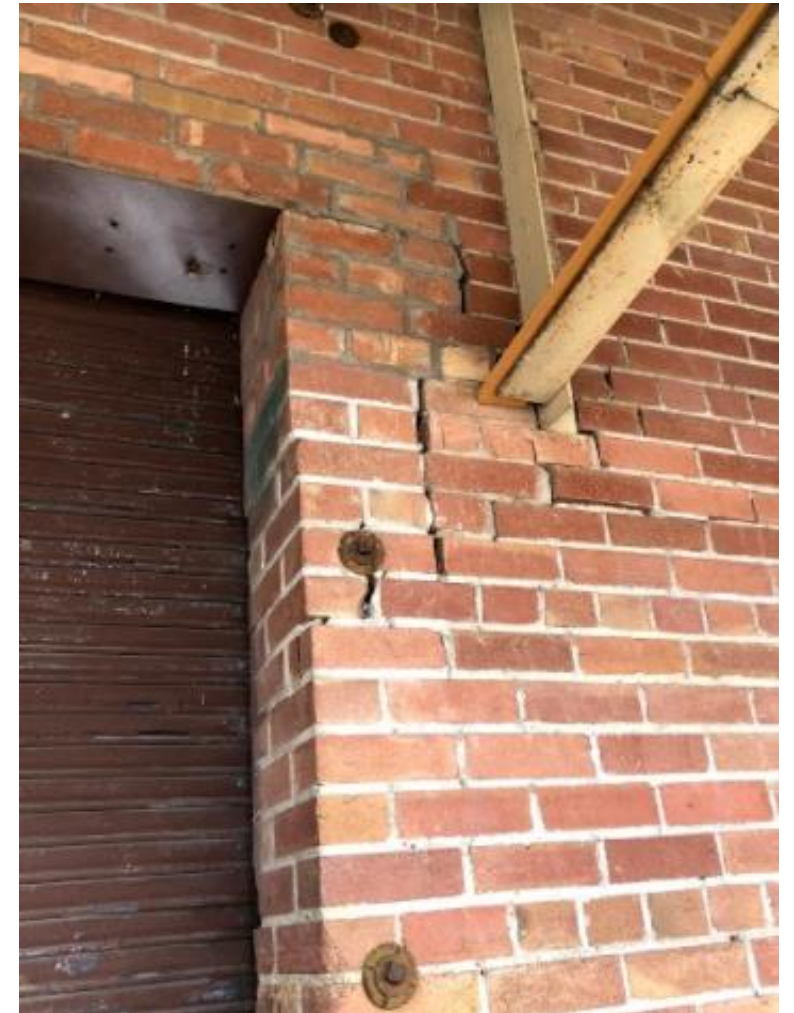
# East Building (Oldest Standing Structure)

Retrofitted Split Members/Apparent Water Damage to Ceiling Deck & Rafters





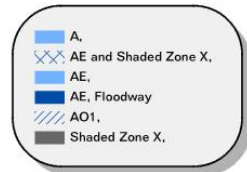
# Unreinforced Masonry (URM)





# Floodplain Concern

## SPANISH FORK FLOODPLAIN

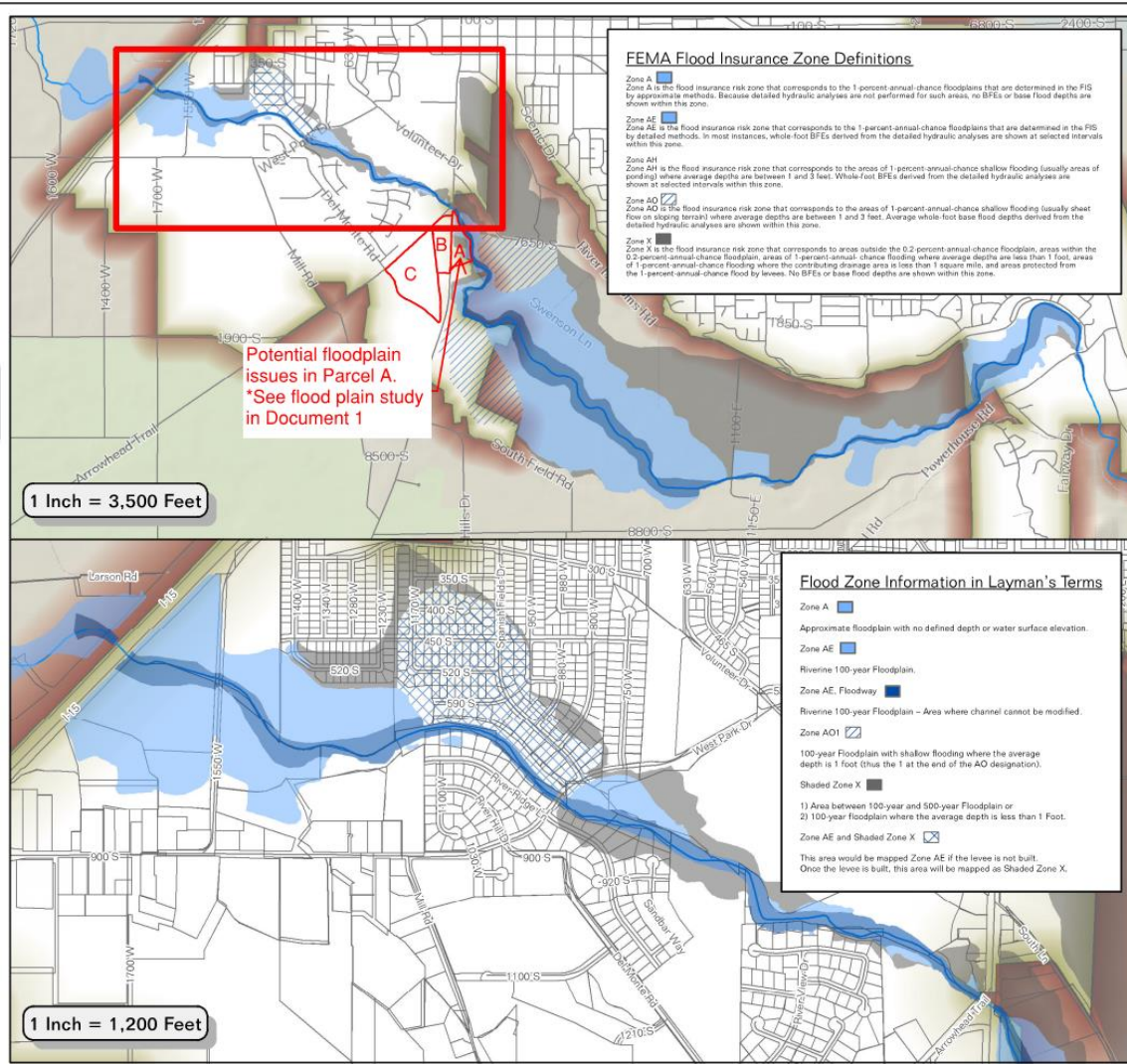


GEOGRAPHIC INFORMATION SYSTEMS

**SPANISH FORK CITY GIS**  
40 South Main Street  
Spanish Fork, UT 84660  
801.804.4571 (Admin)  
801.804.4570 (Interns)  
801.804.4572 (Interns)

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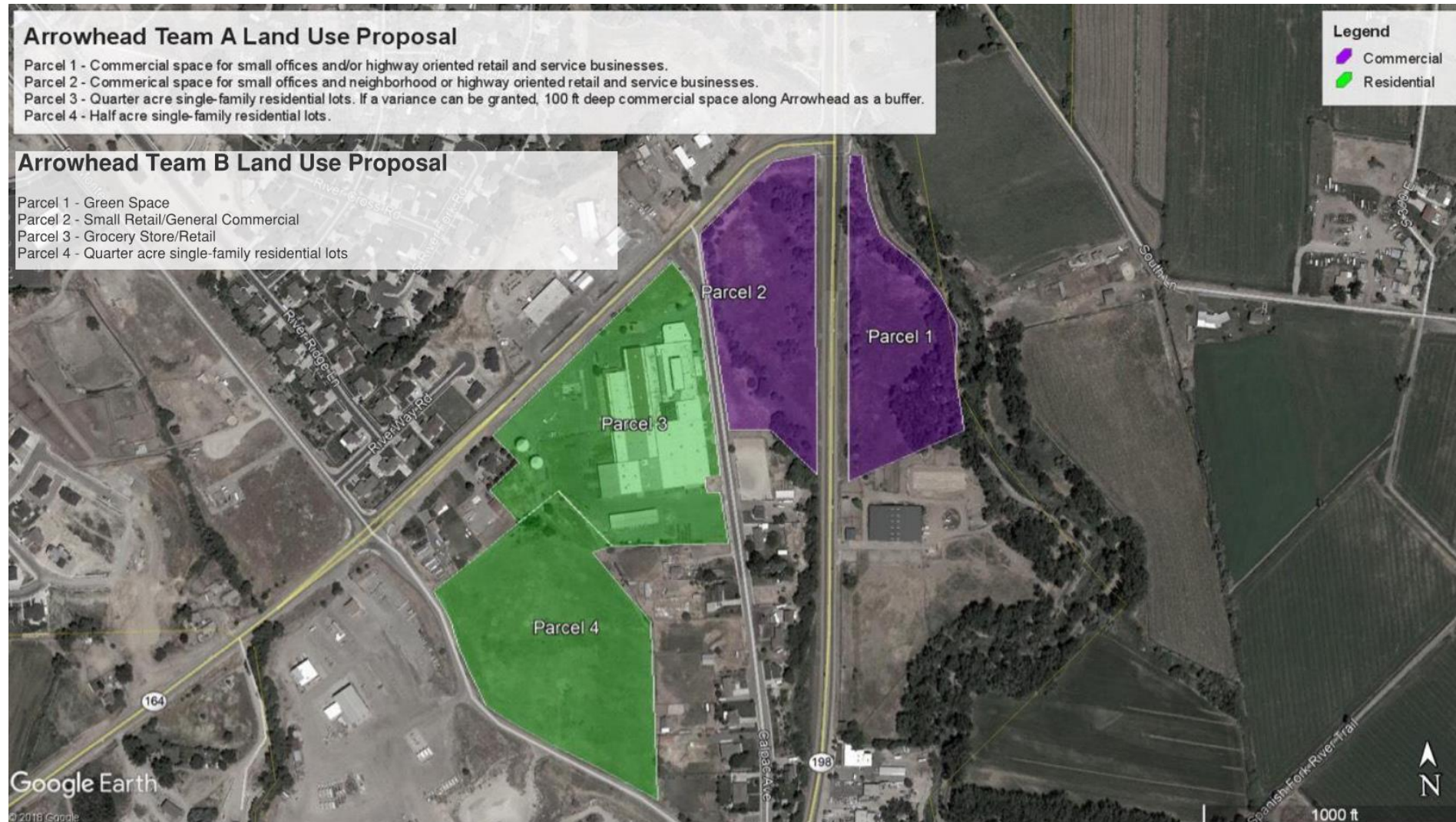
Date Printed: 6/18/2012



- Potential issues in Parcel 1
- Proper drainage must be implemented (refer to recommended drainage solutions in geotechnical report), but the risk of flooding will always remain.
- Spread footings on compacted fill is suggested for foundational support on this plot.



# Proposed Land Use

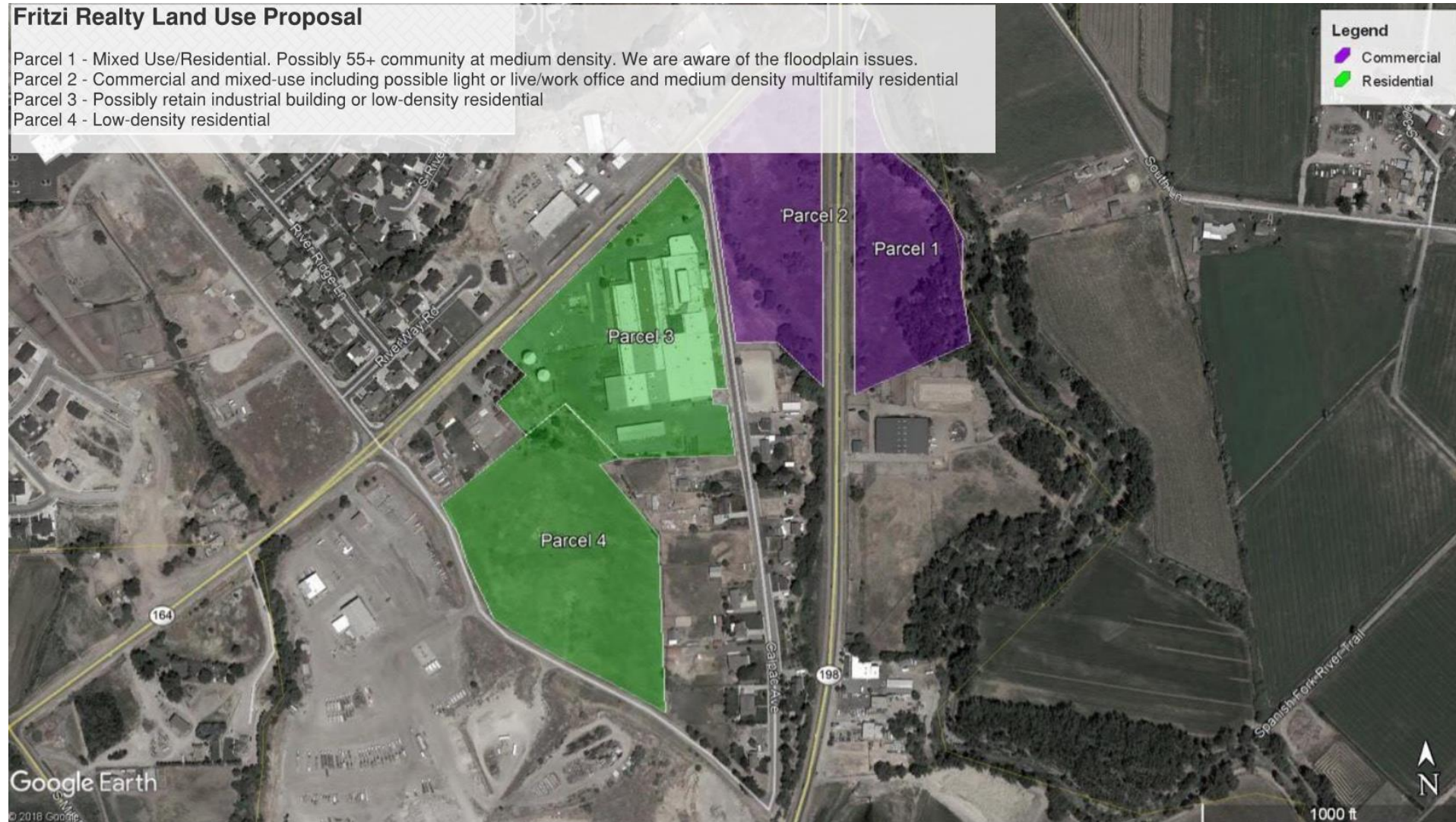




# Proposed Land Use

## Fritzi Realty Land Use Proposal

Parcel 1 - Mixed Use/Residential. Possibly 55+ community at medium density. We are aware of the floodplain issues.  
Parcel 2 - Commercial and mixed-use including possible light or live/work office and medium density multifamily residential  
Parcel 3 - Possibly retain industrial building or low-density residential  
Parcel 4 - Low-density residential





## Conclusions & Recommendations

- Based upon our analyses and the conditions observed during the site visit, we recommend having a licensed structural engineer analyze all damaged members to determine adequacy.
- We also recommend having a licensed engineer analyze the structure to determine if the building is up to the standard of the current building code or if retrofitting is required.
- An attempt to retrofit the building would likely require extensive seismic retrofits for the unreinforced masonry.
- Precautionary measures against potential flooding will need to be taken if Parcel 1 is used to support industrial and/or residential structures.