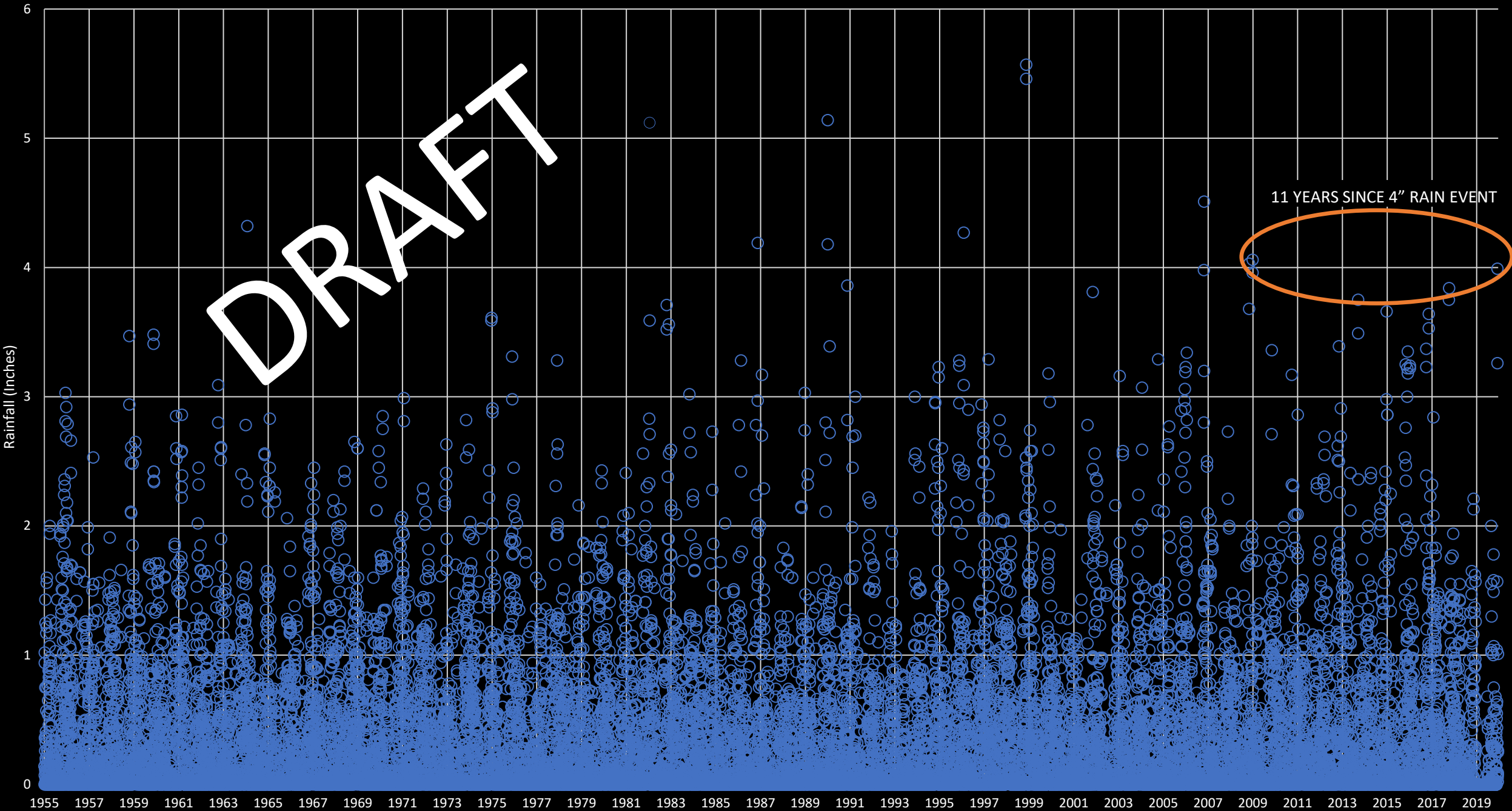
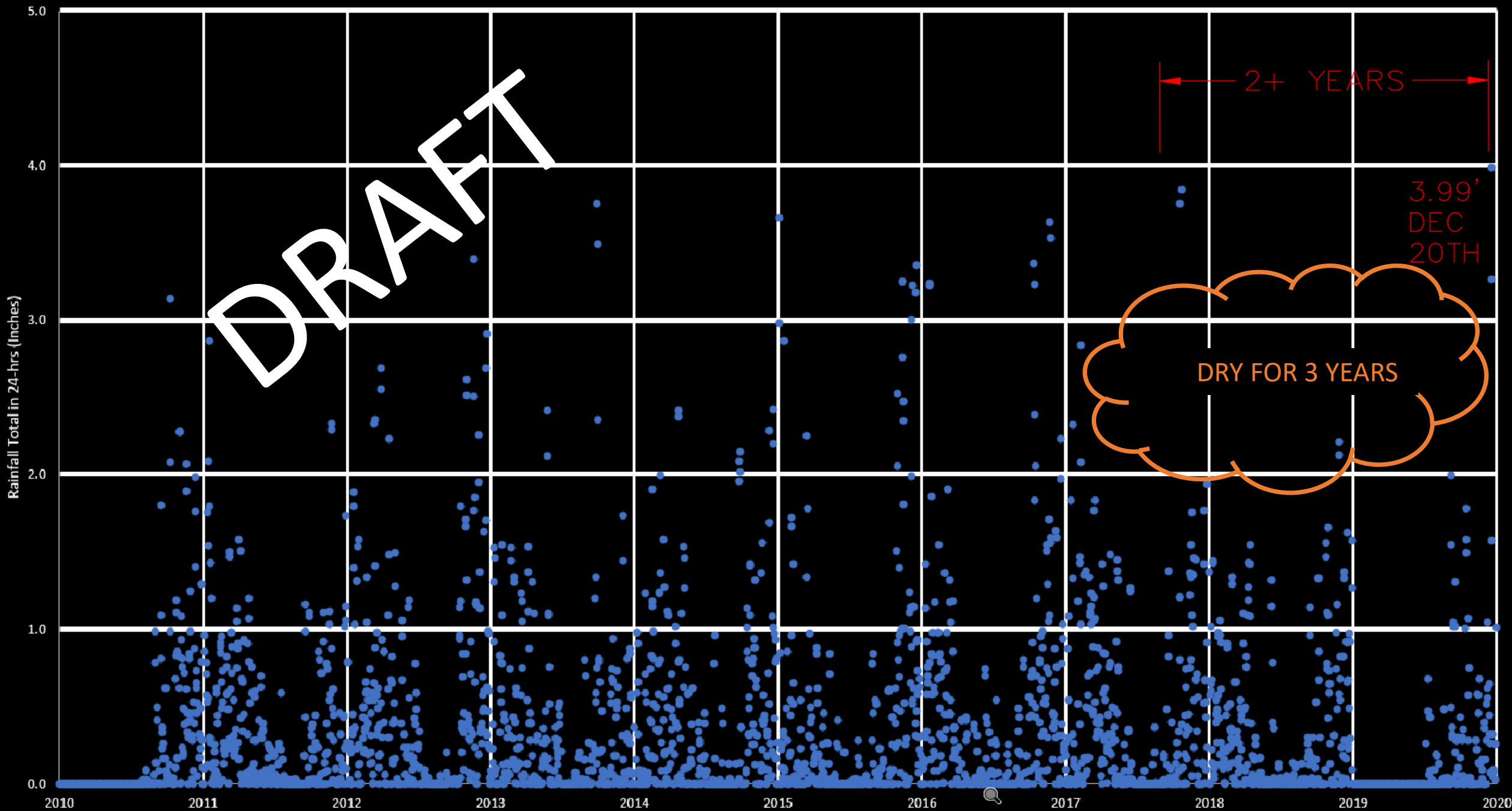


24-hr Rainfall Totals



24-hr Rainfall Totals



Draft 24-hr Rainfall Events

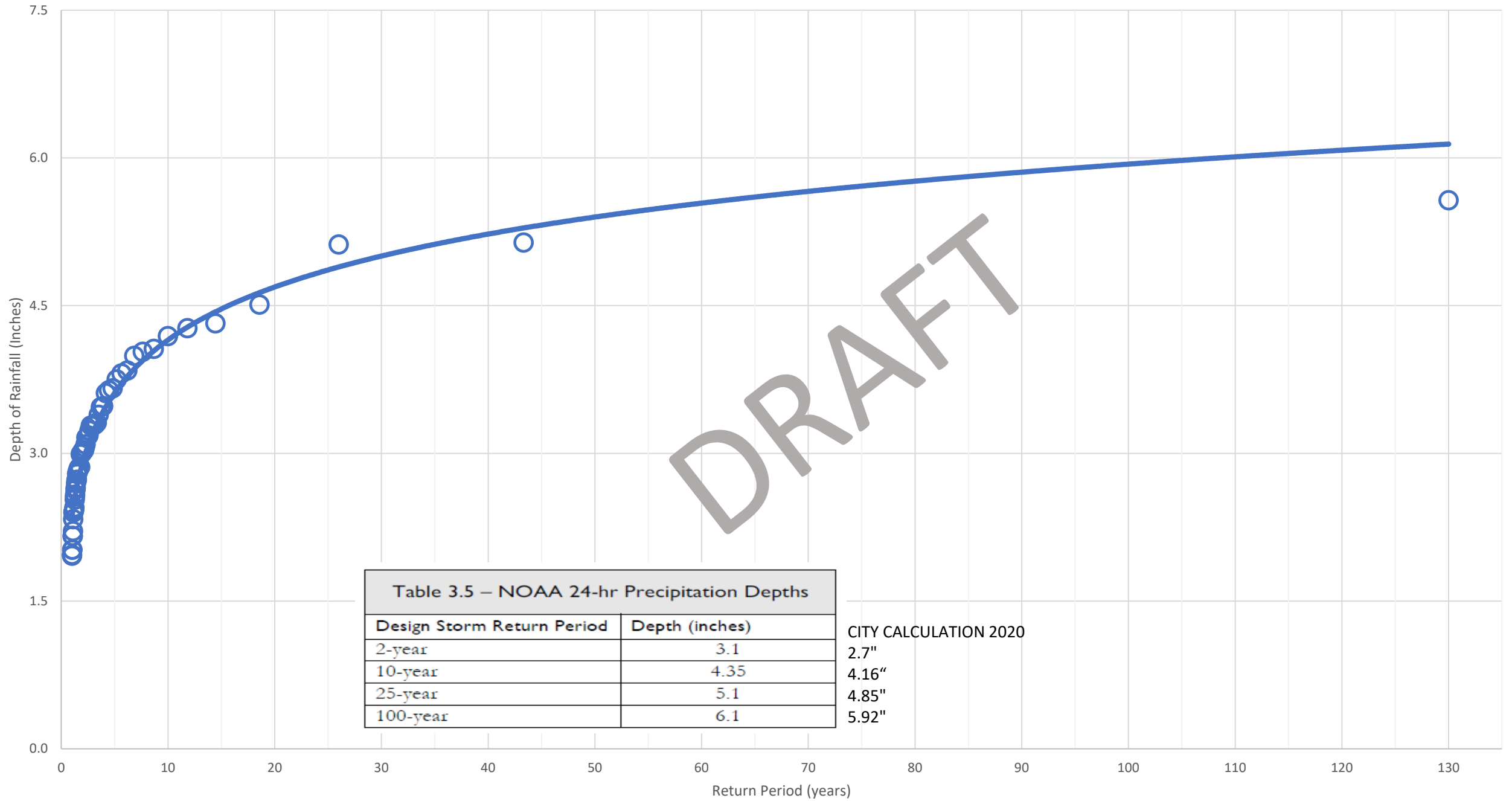


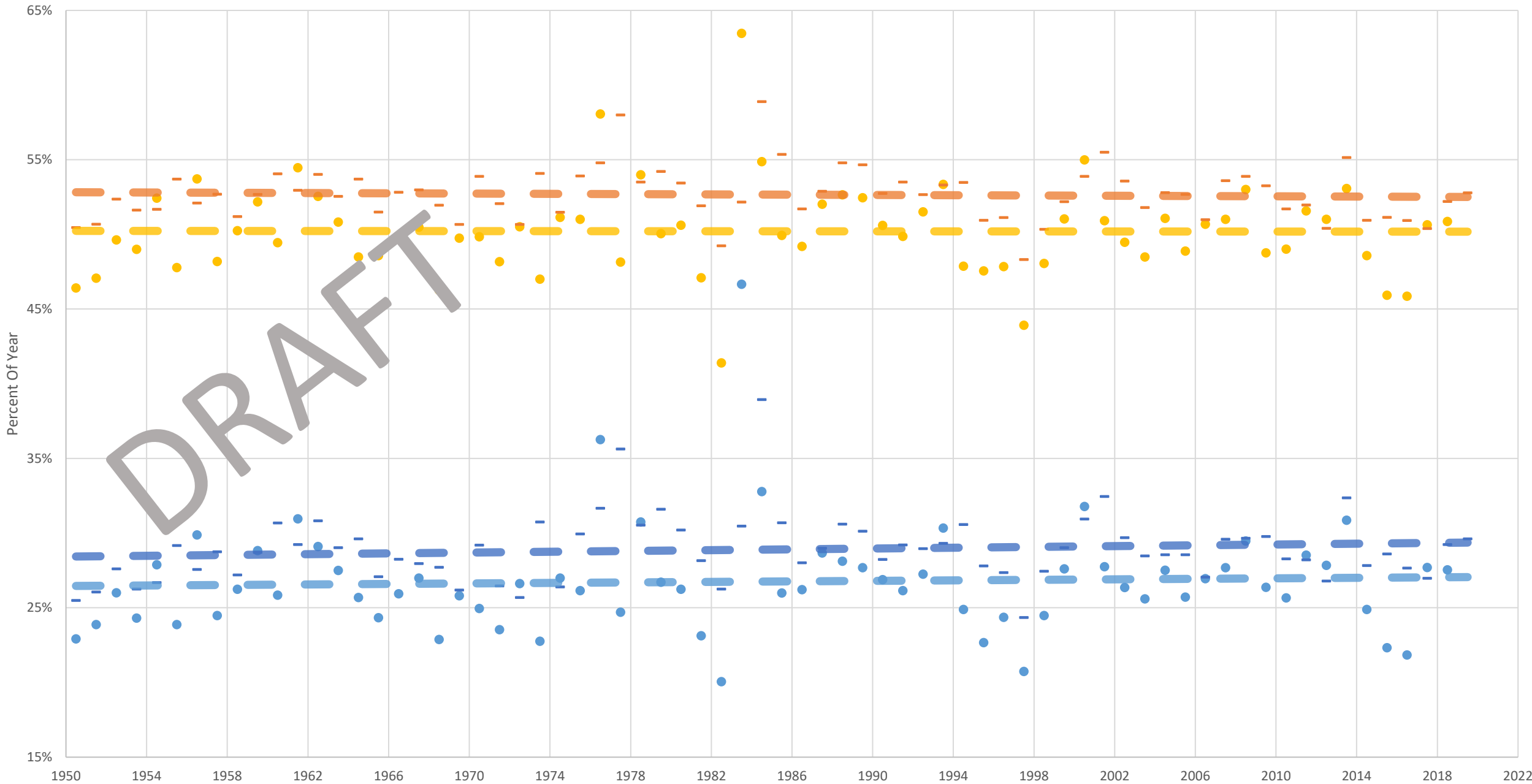
Table 3.5 – NOAA 24-hr Precipitation Depths

Design Storm Return Period	Depth (inches)
2-year	3.1
10-year	4.35
25-year	5.1
100-year	6.1

CITY CALCULATION 2020
 2.7"
 4.16"
 4.85"
 5.92"

Percent of Time our Tide is Below an Elevation

● 3' Oct-Mar - 3' All Year ● 5' Oct-Mar - 5' All Year ● Linear (3' Oct-Mar) ● Linear (3' All Year) ● Linear (5' Oct-Mar) ● Linear (5' All Year)



ISSUES SPECIFIC TO WARRENTON?

1. TIDAL CYCLE
 - a) NEED TO DRAIN RUNOFF QUICKLY WHEN TIDE IS LOW
 - b) DON'T WANT TO DRAIN WHEN TIDE IS HIGH
2. HIGH GROUNDWATER
 - a) DETENTION AND STORAGE OF WATER IS DIFFICULT OR IMPRACTICAL IN LOW AREAS OF WARRENTON
 - b) STORMWATER RUNOFF FROM SATURATED SOILS ARE NEAR PEAK FLOWS FROM PAVED AREAS
3. VEGETATION GROWS VERY, VERY FAST
4. HISTORY
 - a) LITTLE HISTORY IN REQUIRING STORMWATER REPORTS (UNTIL RECENTLY)

WHAT ARE DOING NOW?

1. REQUIRING STORMWATER REPORT FOR MANY/MOST DEVELOPMENTS
 - a) STORMWATER REPORT QUALITY IS LOW, BUT GETTING BETTER
 - b) SOME DEVELOPMENTS HAVEN'T MOVED FORWARD (RIDGE ROAD, E. HARBOR DR., ETC.)
2. UPDATING ENGINEERING STANDARDS
 - a) MORE DIRECTION ON REPORT REQUIREMENTS
3. HAVE ALLOWED INCREASED SYSTEM CAPACITY VS. DETENTION
4. INTERCONNECTING STORMWATER BASINS TO TAKE ADVANTAGE OF BOTH STORMWATER PUMP STATIONS

RECOMMENDATIONS

1. STORMWATER REPORT FOR EVERY DEVELOPMENT (INCLUDING RESIDENTIAL)
2. REQUIRE DOWNSTREAM ANALYSIS FOR EACH DEVELOPMENT (1/4 MILE)
 - a) DOWNSTREAM IMPROVEMENTS WILL LIKELY BE REQUIRED
 - b) DEVELOPER WILL LIKELY INCREASE DITCH AND CULVERT CAPACITY
3. REQUIRE FLOOD STORAGE CALCULATION WHERE NECESSARY
4. CITY CONSTRUCTED FLOOD AND STORMWATER STORAGE PROJECTS (WETLAND MITIGATION)
5. INCREASE CAPACITY OF STORMWATER PUMP STATIONS (NEW: ALDER CREEK, ENTERPRISE, HAMMOND)
6. UPDATE INTERNAL FLOODING STUDIES (LAST ONE 1976, INACCURATE)
7. FINANCE
 - a) IMPROVEMENTS ARE NEEDED BEFORE SOME DEVELOPMENTS CONTINUE
 - b) NEED TO FIND SOURCES TO FINANCE PROJECTS.

RECOMMENDATIONS

8. STORMWATER PUMP STATIONS
9. LARGER DITCHES AND STORAGE AREAS
10. REQUIRE STORMWATER REPORTS FOR ALL DEVELOPMENTS