Variables and their values:

Length of Bridge (**L**)=15 meters

Mass of Bridge (**mu**)=28125 kg/m (this values is one that changes with rain)

Modulus of Elasticity (**E**)=35 GN/m^2 (this value is one that changes with temp and damage effects) You may not be able to monitor the change of this one because it changes differently on certain members, i.e. not consistent across the bridge.

Moment of Inertia (**I**)=.5273 m^4

Damping Ratio (**beta**)=.02

Natural Frequency (**wn\_ref**)=35.53 rad/s (this value changes with temp, damage, vehicle size, vehicle location, rain) I created a variable, **wn\_FEA**, that stores the calculated natural frequencies for each time step during an individual vehicle run. Rows 1 and 2 will be of the most interest in this study. I then created a cell array, **AllFrequencyData**, that stores the natural frequency values, rows 1 and 2, for every vehicle run of every day for a year.

**WindVelocity**: this is the velocity of wind at each vehicle run

**ForceWind**: this is the force wind is applying in a downward direction for each vehicle run

**air\_density**

**AccelerationVehicle**: This variable stores all the acceleration data for every vehicle for an entire year.

**Tact**: This is the temperature at the time of each vehicle run

**Rain**: This is a matrix letting us know if it rained on a specific day or not. 0 means no rain, 1 means it rained.

**VehicleMass**: this is the mass of the subject vehicle for each crossing for an entire year. (Mass is allowed to vary but you are not able to know how it changes, because we will not know in the real world)

**WheelMass**

**SuspensionStiffness**

**WheelStiffness**

**SuspensionDamping**

**WheelDamping**

**fv** this is the natural frequency of the vehicle. (it takes into consideration the actual weight and stiffness of the vehicle)

Velocity (**V**) = this is the velocity for each vehicle for every crossing for an entire year.

**Time**: The time vector for a single vehicle crossing. Stored in a cell array so that time histories for each vehicle crossing for an entire you was recorded.