Kalamazoo Route Planner Requirements

1. **Functional Requirements:**
   a. Plans a route for bicycle/walking based on 2 nodes the user will enter on a map of Kalamazoo and Portage.
   b. Sends two lists to the back end, one comprised of the start point and the end point, and another comprised of the transport type, risk tolerance and the amenities that the user has chosen.
   c. Uses the A* algorithm with the list of two points collected to compute the best path based on the user's input.
   d. Road favorability is determined by the city of Kalamazoo's plan/worksheet to migrate roads to be more bike and pedestrian friendly by 2025.
   e. Displays the route to the user via a line along the roads from start node to end node and will display the Route to the user as well as amenities.

2. **User Interface Requirements:**
   a. Displays a map of Kalamazoo and Portage, the user will be able to zoom, scroll, or place nodes.
   b. Users will be locked to only entering points within a box bounded by latitudes and longitudes of the Kalamazoo/Portage area. ([42.157, -85.663], [42.333, -85.531])
   c. Hidden navigation bar can be opened on the left side of the window, the navbar will contain transportation type, risk tolerance, amenities, a clear, about, and help button.
   d. Radio style button displaying transportation types.
   e. Allows the user to use one slider to dictate the user's risk tolerance of roads.
   f. Allows the user to turn on and off layers via checkboxes, these layers will contain amenities of the area.
   g. Export GPX Button to export the directions to a GPX file for download and further use for navigation in other applications.
   h. Help link to display a popup to the user that displays info about the terminology of the web page.
   i. About link to display a popup to the user that displays info about the people who worked on the webpage along with Modeshift Kalamazoo
   j. Clear link in the navbar that allows the user to start over and reset the web page back to default settings.

3. **Capabilities Requirements:**
   a. Take 15-30 seconds to plan and display a route and will run on chrome, firefox and safari.

  b. Runs on Apple and Android devices by having a responsive web page based on display size.

  c. Database will not use more than 500MB of space.

4. **Software Interface Requirements:**

  a. Connect to the OpenStreetMap (OSM) API, Overpass API, and a database pulling data from OSM.

  b. A custom database will be created and maintained via SQLite3.

  c. The user can export a GPX file that they can then use as input into other mobile GPS apps such as Strava or Google Maps.

5. **Software Input/Outputs and Data Requirements:**

  a. Take the start and end points from the user clicking on the map.

  b. Use a radio style button to allow the user to pick their preferred mode of transportation.

  c. Radio button shall have options of

    i. Walking

    ii. Biking

  d. Allow the user to use sliders to set road preferences.

    i. Sliders will be a weighted option that will use the values in the database.

    ii. These slider options will be

      1. Risk Tolerance

  e. Allow the user to select different amenities they want displayed on the map.

    i. These amenities include

      1. Art
      2. Bathrooms
      3. Bike Parking
      4. Bike Repair
      5. Bike Shops
      6. Books
      7. Businesses
      8. Café
      9. Community Hubs
      10. Drinks
      11. Food
      12. Grocery Stores
      13. Pharmacy
      14. Sculptures
      15. Treats
      16. Worlds of Wonder

  f. Amenities will display a popup with information about the location as well as a button that can be clicked to mark that location as a marker

g. Clear button in the navbar that will deselect all checkboxes and remove all markers on the map.
h. Link button that will take the user to an about page explaining how to use the site and the definitions of the terminology used on the web site.
i. Outputs a series of directions in the web browser next to the map or drawn on the map.
j. The route will be able to be exported via GPX.
    i. These files will contain latitude and longitude coordinates that can then be used by another service or program, like the users preferred navigation app.
k. Takes in data from the OSM API/database and graphs the data together with weights of favorability added to the roads.

6. **Installation and Maintenance Requirements:**
    a. Installed on a server that will require routine maintenance and bug fixing.
    b. The Custom database should be updated periodically via manual running of a script, to make sure all the nodes and ways are linked properly and are up to date, this will be handled by a bash and python script that will interface with the database.