Step 1: Initialize the algorithm parameters in NSGA-II.

Define chromosome coding method (e.g., binary encoding, real-value encoding).

Set the population size, crossover probability, mutation probability, and maximum number of iterations.

Initialize an empty parent population.

Set the generation count to 0.

Step 2: S-ETNDP road traffic flow assignment and fitness value calculation.

For each individual in the parent population:

Use the Frank-Wolfe algorithm to solve the lower-level traffic assignment model.

Obtain road traffic flow between each origin-destination (OS) pair.

Substitute the road traffic flow into the upper-level model.

Calculate the fitness value for the individual.

Step 3: Population update using NSGA-II algorithm.

Create an empty offspring population.

While the size of the offspring population is less than the population size:

Select two parent individuals from the parent population using the roulette wheel selection method.

Apply crossover with a probability of crossover probability to create two offspring individuals.

Apply mutation with a probability of mutation probability to the offspring individuals.

Add the offspring individuals to the offspring population.

Step 4: Execute operations using NSGA-II algorithm.

Step 4.1: Non-dominated sorting operation.

Perform non-dominated sorting on the combined parent and offspring populations.

Assign a non-dominated ordinal value to each individual based on its non-dominance rank.

Create a set of non-dominated solutions for each non-dominance rank.

Step 4.2: Individual crowding distance calculation.

Calculate the crowding distance for each individual in each non-dominated set.

Assign a crowding distance value to each individual based on its proximity to other individuals within the same set.

Step 4.3: Elite retention strategy.

Sort the individuals in each non-dominated set based on their non-dominance ordinal value.

Select the top individuals from each non-dominated set, prioritizing those with lower non-dominance ordinal values, until the size of the new parent population is reached.

Step 5: Determine if the maximum number of iterations has been reached.

Increment the generation count by 1.

If the generation count is less than the maximum number of iterations, go back to Step 2.

Otherwise, proceed to Step 6.

Step 6: Output the Pareto optimal solutions and terminate FW-NSGA-II.

Output the individuals in the final parent population that belong to the first non-dominated set.