The objective of the slab registration algorithm is to maintain a correct registration of slabs across years with respect to a base year. This, considering repairs and maintenance may alter the number of slabs from one year to the next by creating or eliminating joints. The slab registration code works on the basis of slab length. It starts by taking the first slab from the base year (BY), BY slab 1, and comparing it to the first slab from the next year of available data, which we call the current year (CY), CY slab 1. If the slabs are the same in length (plus minus an interval), CY slab 1 is said to correspond to BY slab 1. This means that the matching slab ID for CY slab 1 is 1 (matching slab IDs always refer to the BY). The code uses a small interval to account for unprecise measurements. This interval is always used when comparing the length of two slabs. Given that the slabs matched, meaning the difference between the length of CY slab 1 and the length of BY slab 1 is close to zero, we move to BY slab 2 and CY slab 2. Again, slab lengths must be compared. While it is most common that slabs are of the same length, there are three other cases that must be considered. They are pictured below.

Table

Description automatically generated

From left to right, the first of these cases is replacement within original slab limits. In this case, the CY slab is shorter than the BY slab, creating one additional joint (as illustrated above), or two additional joints. In this case, the code would compare the length of the BY slab to the CY slab and determine that the CY slab is shorter than the BY slab. Referring to the example above, it would set the matching slab ID for CY slab 2 to 2 and move on to CY slab 3. Because CY slab 2 failed to account for the complete length of BY slab 2, the code will not move to BY slab 3 but will remember that a certain amount of length (in this case 9ft) on BY slab 2 is accounted for. It will then compare the length of CY slab 3 (11 ft) to the length of BY slab 2 (20ft) minus the length of CY slab 2 (9ft). Now, the difference between lengths is 0, meaning the matching slab ID for CY slab 3 will be set to 2 and the code will move to CY slab 4 and BY slab 3. The procedure for the next two cases is similar.

The next case is replacement of two consecutive slabs on their common joint. In this case, like the first case, the code is comparing slabs and realizes that the slab from the CY is shorter than that of the BY. It assigns a matching slab ID for the CY slab and moves on to the next one but stays in the same BY slab. Next the code realizes that the length of the new CY slab is greater than the remaining length of the BY slab. In this case, it halves the length of the CY slab and compares that to the remaining length of the BY slab. In the example illustrated above that would be comparing 4ft (half of the length of the CY slab) to 2ft. Because 4ft is greater than 2ft, it assigns the CY slab to the next BY slab. In this case the matching slab ID for CY slab 2 would be 2. This because most of the slab is in what used to be BY slab 2. It would then move to CY slab 3 and BY slab 2 but would subtract the 6ft (which come from the second part of CY slab 2) from the length of BY slab 2 when comparing it.

The last of the cases is replacing original slab with a longer one. Parting from the conclusion of the last case, the remaining length of the new CY slab is 6ft. If instead of 6ft the number was 26ft, as in the last example, the code would realize that this number is greater than the length of the next BY slab and move on to the BY slab that follows that one. It will still take the extra 2ft that go into BY slab 3 in consideration for the next operation.

These three cases form the basis of how the slab registration code works. In many cases, there is a mixture or multiplicity of the cases that the code is prepared to handle. The code outputs a spreadsheet that looks like the one pictured below. Parameters interstate, direction, and slab states are user inputs. MP From, MP To, BY Slab ID, replaced, year replaced, replaced and broken and possibly original replacement, are determined by the code.

