



White Paper on Sidewalk Condition Index (SWCI)

SWCI Methodology and benefits

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When faced with the need to plan sidewalk rehabilitation work, municipalities often first prioritize citizen complaints and then categorize and rank the rest of the sidewalk network based on simple visual condition rating scales. This method has been used by many municipalities for decades, but it lacks proactivity and repeatability. The sidewalk asset management industry has no standardized methods for quantifying the condition of sidewalks. This is opposed to pavement in roadway asset management practice, which has the widely recognized and utilized ASTM D6433 standard to guide condition assessments. To address these deficits, ICC-IMS developed the Sidewalk Condition Index (SWCI).

The SWCI is a value on a scale from 0 to 100 that is calculated for a given sidewalk segment and can be used to rank or prioritize sidewalk segments for rehabilitation. Where possible, it mimics the calculation of the Pavement Condition Index (PCI) that is outlined in ASTM D6433. As many pavement engineers and public works officials are familiar with the PCI, this was deliberately decided to make the calculation familiar and repeatable. Essentially, the various distress types and their associated severities that are observed throughout the sidewalk network are noted for each segment (see Figure 1). This collected data is then used to determine the ‘density’ of the various distresses for each segment. The distress densities are then used to determine deduct values for the various distresses. Deduct values are then subtracted from 100, which is the highest possible SWCI score and represents a sidewalk segment that is in excellent condition (see Figure 2). Larger deduct values, and consequently lower SWCI scores, result from sidewalk segments having issues such as high distress density, high severity distresses, and/or critical distresses (i.e., safety concerns). When calculated for an entire sidewalk network, SWCI scores can give objective, practical insight into the order in which municipalities may want to complete future rehabilitation work (see Figure 3).



Detailed steps for calculating SWCI for each sidewalk segment in a given network:

1. Collect and process distress data
 - a. One distress type and severity per slab (or pseudo slab) should be noted. This allows for the count of distressed slabs (or pseudo slabs) to be determined for each distress.
2. Estimate total slab (or pseudo slab) count from segment length, weighted average segment width, weighted average slab length, and weighted average slab width
 - a.
$$Total\ Slab\ Count = \frac{Segment\ Length * Segment\ Width}{Slab\ Length * Slab\ Width}$$
3. Use count of distressed slabs (or pseudo slabs) and total slab (or pseudo slab) count to determine the density of each distress
 - a.
$$Distress\ Density = \frac{Distressed\ Slab\ Count}{Total\ Slab\ Count} * 100$$
4. Use distress densities to determine deduct value for each distress
 - a. This requires the use of ICC-IMS developed deduct curves.
5. Sum all distress deducts to get Total Deduct Value (TDV)
6. Sum distress count
7. Adjust TDV for distress count to get Corrected Deduct Value (CDV)
 - a. This requires the use of ICC-IMS developed Q-Correction curves.
8. Subtract CDV from 100 to get SWCI
 - a.
$$SWCI = 100 - CDV$$



Figure 1: Collected Distress Data

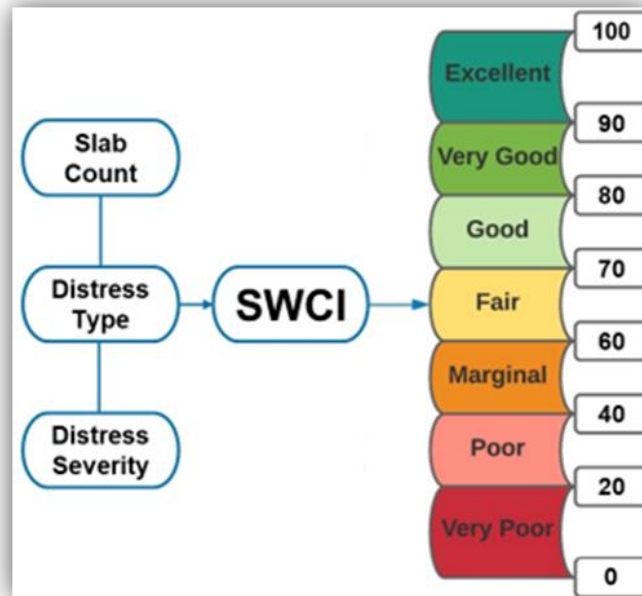


Figure 2: General SWCI Calculation Diagram

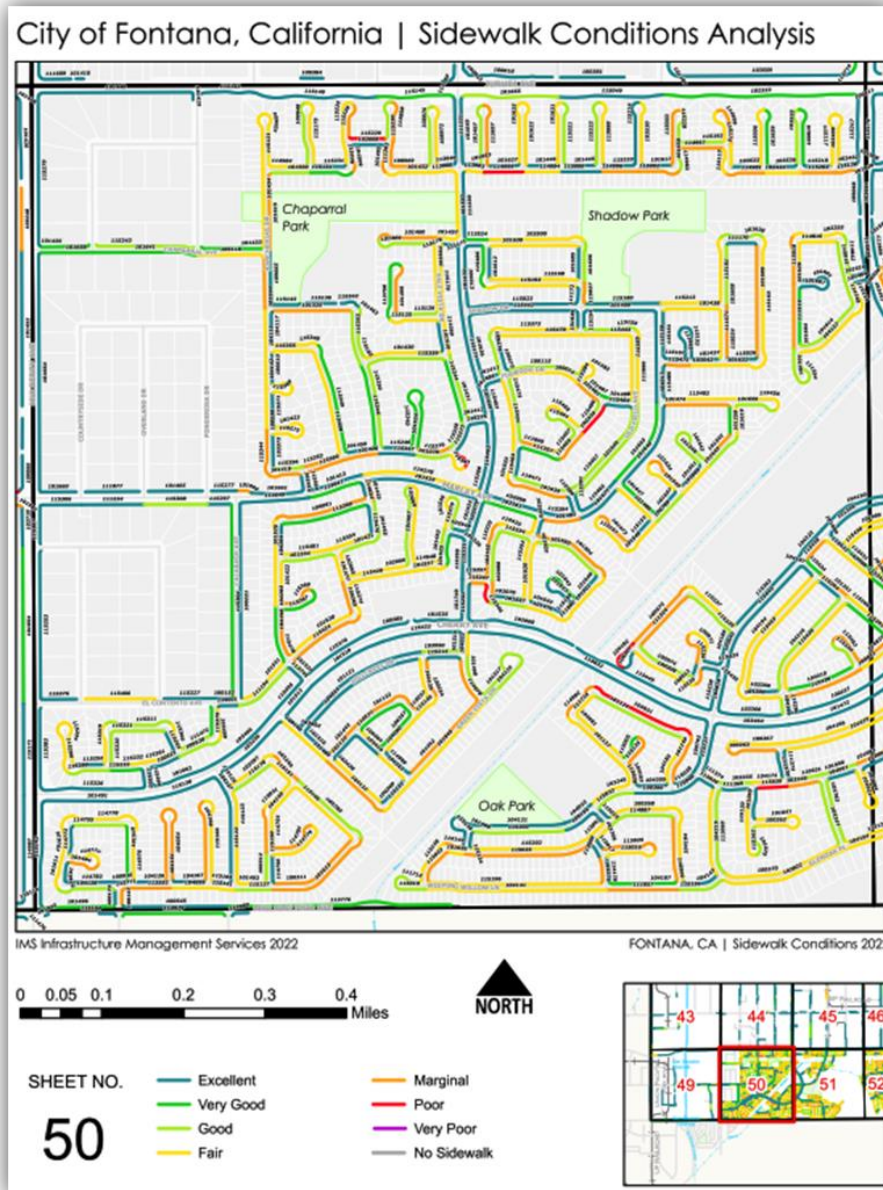


Figure 3: Practical Rehabilitation Plan Developed Using SWCI