Deficiency vs. Distress Based Inspection and Asset Management Approaches: A Primer

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Investing in a capital asset management program for existing, multi-building portfolios can yield pay backs like larger budgets, more efficient execution, improved buildings, satisfied tenants, and grateful owners. It can also help eliminate unforeseen demands on daily maintenance operations and replace chaos with order. Questions it answers for facility managers include: "What work do I need to do?" and "How much will the work cost?"

There are two distinctly different methodologies for answering these questions: a deficiency-based approach and a distress-based approach. From time-to-time confusion occurs regarding what a deficiency is and how it differs from a distress. Some people erroneously believe that they are one in the same. More importantly some may not fully grasp how the differences impact the capital asset management process. This primer is intended to provide the necessary clarity.

Deficiency-based Approach

This most common approach consists of an experienced inspector (or inspection team) going to a facility and recording "deficiencies"' or problems that needs to be fixed. Deficiency examples are, "Repair leaky roof" and "Paint conference room." As part of the inspection process, the inspector will usually estimate the rough work quantity and later, usually in the office, also estimate a scoping cost estimate. Often inspectors will attempt to estimate a "remaining service life" for components. For example, an air handling unit may be old, but working. An inspector may feel that it needs to be replaced in 2-3 years and, thus, may record that as a deficiency.

Upon the completion of the facility inspection and follow-on office work, a list of deficiencies for that facility is compiled. These deficiencies form individual work item "candidates." Some work items may be combined into larger and logical project "candidates." (Note: To avoid semantics issues, for the purposes of this discussion any work that is uniquely identified, regardless of scope and cost, is simply referred to as a "work item.") All work items are candidates for funding and thus are added to the job jar containing other work items for other facilities and maybe this facility, as well. The overall asset management process, which includes prioritizing the work items (in relation to one another) and budgeting to pay for them, then takes over until the work items are ultimately completed or cancelled. (Note: It is recognized that the scope of the work item may dictate the management process, fund source, priority, etc.)

The skill and experience of the inspector are crucial to the process because considerable judgment must be exercised. Other than when brand new, facilities are not expected to be, nor do they need to be, in pristine condition. Some degradation is expected and allowed. So, the inspector must exercise considerable judgment as to what is a recordable deficiency and what is not. This is a subjective call. In the inspector's mind, some sort of a standard exists. However, two different inspectors may very well have differences in opinions. Even if an agency or organization attempts to establish standards, they are subjective, at best, and open to interpretation by inspectors.

Condition assessment metrics are a key element to facility asset management. These metrics, though, are dependent on the inspection approach. Deficiency-based condition assessment consists of summing the total costs of all of the deficiencies. This summation is sometimes divided by the replacement value of the facility to provide the commonly known "Facility Condition Index (FCI)." This FCI value (or derivatives such as the Federal Real Property Council's CI = 1 – FCI) is used in the asset management process to whatever purpose is deemed useful by the agency or organization. Normally, the usage serves a strategic role in work planning and execution. Usually, though, condition assessment does not drive inspection planning or execution. Facilities (and their respective components) are most often scheduled for inspection based on the calendar, not on their condition. (There are exceptions, of course).

With a deficiency-based asset management approach, work item creation occurs at the beginning of the process. It's the creation and periodic refreshing of the job jar that drives the process. An unfortunate aspect of this is that the work items become out-of-date over time. A new inspection is needed to refresh. The degree of "staleness" will vary depending on the degradation mechanism, degradation rate, and time since the last inspection (sometimes years). Further degradation affects the magnitude of the deficiency and repair scope. Consequently, asset management decision-making is often based on out-of-date information.

<u>Distress-based Approach</u>

A distress-based approach consists of a trained inspector (or inspection team) going to a facility and recording what's wrong as defined by a finite and standardized "distress type" list. Examples include "cracked," "damaged," "broken," and "stained." Then for each distress type found, a "severity level" is assigned that addresses "how bad" the distress is. Usually, there is a choice of three, with "Low" implying minor, "High" implying life-safety and/or other critical attributes, and "Medium" implying serious, but not critical. Finally, the inspector records the density that quantifies the extent of the distress. All subcomponents for each component are inspected. Subcomponents that are "Defect Free" are also noted. Inspectors do not determine a repair scope or cost, nor do they attempt to estimate a "remaining service life" for components.

Upon the completion of the facility inspection, the complete list of distress types, severity levels and density for each component subcomponent is compiled. There is no attempt or need to identify individual work item "candidates" at this point. Rather, these distresses provide the data needed for determining the condition of the various building components. It is the condition assessment of the various components that will drive the work item generation process later in the overall asset management process. Then, once the work items are generated the asset management process, including prioritizing the work items and budgeting, continues until the work items are ultimately completed or cancelled. (Note: As it is in a deficiency-based approach, the scope of the work item may dictate the management process, fund source, priority, etc.) How the work items are actually generated is discussed below.

While inspector skill and experience is always a plus, those attributes are not crucial to a distress-based inspection process. This is because inspector judgment is minimized. What is crucial is that inspectors follow the standardized definitions of distress types and severity levels to ensure proper identification. They must also have the ability to accurately measure or estimate density and they must adhere to a structured inspection process. In other words, inspectors need to follow the "rules." By following the rules, different inspectors will identify the same distress types, severity levels, and (within reasonable error) density. Condition standards do not enter into the inspection data collection process.

Distress-based condition assessment is more robust than deficiency-based condition assessment. Not only can a distress-based approach provide the same backlog, FCI, or FCI derivative metrics, but it also provides for a "Building Condition Index (BCI)" series of metrics. The BCI series is a condition measure on a 0-100 scale and is applicable to all levels of the building hierarchy (component-section, component, system, and building) and building groups. The lowest level is a component-section which is a component identified by material and type. For example, a wall component may consist of two component-sections: wood and masonry. This is needed because service life and degradation will vary based on material and type. These, in turn, affect work needs. The Component-Section Condition Index (CSCI) is computed from deduct values associated with distress types, severity levels and density. Deduct values are points that are subtracted from perfect score of 100. Component-sections are the "management units" upon which work decisions are made. Their condition (as measured by the CSCI) will establish work item scope and cost. The other hierarchy CIs (roll-up values from the CSCI) serves other asset management purposes. CSCIs (and the other CIs) can also be historically tracked and predicted. Rates of deterioration can be computed and remaining service life can be estimated.

The CSCI serves many strategic and tactical purposes related to work planning. One strategic purpose is that minimum desired condition standards can be set based on them. Tactically, if the condition is above the standard, no work item is needed or generated. If the condition is below, a work item is needed to raise the condition to a value above the standard. Thus, work items are not generated by a subjective interpretation by inspectors, but rather in an objective manner based on agency or organization goals and needs. Another use takes advantage of the relationship that work item cost is related to the CSCI. Thus, a work item scoping cost estimate can be computed by simply knowing the CSCI. Repair versus replace decisions will be based on economics, standards, and the computed remaining service life. Inspectors do not spend time back in the office after the inspection computing costs.

With a distress-based asset management approach, work item creation occurs towards the end of the process. Work item generation is a result of the process described above, not the prime input to the process. Since the CSCI can be predicted from its last known point (the last inspection) to the present and future, work items are automatically updated based on the predicted CSCIs. Thus, current and future work needs and estimated costs do not become stale. As a result, asset management decision-making is based on “real time” information. Also, the CSCI can drive the inspection planning and execution process. The various component-sections in a facility can be scheduled for inspection based their expected condition (and other variables, including deterioration rates), not the calendar. New inspections serve to confirm or adjust CSCIs and refine the degradation (life-cycle) curves for the various component-sections.

Is One Approach Better than the Other?

Since both approaches answer the questions, “What work do I need to do?” and “How much will the work cost?” does it matter which approach is used? Is one better than the other? The answer is, “It depends….”

Deficiency-based decisions are prevalent in our everyday lives. It’s the approach used when we take our autos in for routine service and check-up, call the heating and cooling company to perform routine service and inspect our home heating system, have a home inspection, and simply see things (deficiencies) in our homes that need repair and decide to fix them or not. Thus, it’s an approach with which we are all familiar and comfortable. It works well in the examples cited because it’s simple, there is an inherent knowledge of the asset, the asset portfolio size is small, and there is a comfort factor associated with the consequences of the decision (do the work; don’t do the work).

However, when assert management encompasses more than just a few facilities, a distress-based approach is most advantageous. The differences in the approaches were described above and it is those differences that highlight the advantage of a distress-based approach. With all but the smallest of facility portfolios, the inherent knowledge of any individual asset is diminished (and in many cases minimal) and decision-makers must rely on information from others. This information needs to be objective, consistent, and current. Plus, it must be economical to gather. In short, a distress-based approach is robust, faster, consistent, and less expensive when compared to a deficiency-based approach, especially when the efficiencies of modern computer applications are employed.