

NCDOT ITEM TYPE VISION

Trusted, portable data — captured in the way we already design

Purpose and Audience

This document describes NCDOT's vision for item types — what they are, why we are building them a specific and consistent way, and how they will become available over time. It is written for both NCDOT staff and our industry partners, and for both the designers who do the work and the project managers who plan and scope it, so that everyone working on NCDOT projects shares the same understanding of where item types are headed and what to expect at each stage.

This is a vision document. It describes NCDOT's direction and the phased path to get there; it is not itself a standard or a contractual requirement. Where and when item types become required will be defined and communicated separately, through the Project Delivery Network (PDN), as described below.

The Item Type Vision

At its core, the item type vision is a commitment to capture the right information once — as a natural product of good design — so it can be trusted and reused everywhere it is needed downstream. Item types let each element in a model carry meaningful data such as its identity, its pay item, its location, and its quantity, and that information stays with the element from design, through the handoff to construction, and into asset management.

We have been deliberate about building item types a specific, consistent way because consistency is what makes the data trustworthy and portable. When every discipline captures the same core information in the same structure, quantities can be pulled accurately, reports trace back to a single source of truth, and the same data serves the greatest number of people and tools without manual rework.

How Item Types Roll Out — and What to Expect

Item types for all Units are being introduced in phases through the NCDOT quarterly WorkSpace updates. As each set of item types is released into the WorkSpace, they are available for project teams to use, but are not required. Project teams are welcome to begin using item types on their projects wherever they find them beneficial, and whether to do so on any given project is the project team's choice while they remain optional. Because use is optional at this stage, no added scope or level of effort is being imposed — you adopt item types where the benefit is worth it to you.

Using item types today also does not change how plan sets are produced or delivered; that will come at a later phase. As item types are built, NCDOT will develop dynamic reporting that generates quantities directly for each plan set. Those capabilities will be validated and approved for use by NCDOT before any project is asked to rely on them. The status of each item type can be found here: [NCDOT Digital Delivery Item Type Readiness Report](#)

When item types and dynamic reporting do become required, that will be communicated through the PDN, which will identify the specific projects required to use them, along with the scope and timing expectations that come with it. You will not be asked to absorb a new requirement without it being reflected in project scope and communicated in advance. Until the PDN has been updated, item type use remains optional.

Designed Around Your Workflow

NCDOT's approach to item types begins with a simple commitment; the tools should fit the way you already work. You should be able to design the way you naturally would, using familiar tools and established processes, while the information that downstream teams depend on is captured along the way. Item types are meant to work with your process, not reshape it.

These workflows follow a similar overall process, but the specifics are tailored to meet each discipline's unique needs. The guiding principle stays the same throughout we automate wherever we can without adding burden to the designer. Where automation is straightforward, pay items are applied for you as you design. Where it is not, that same principle means certain quantity selections can be deferred to a later point in the process rather than forcing extra steps into the design. In short, there are two complementary pathways:

- **Automatic Pay Item Population**
 - **How it works:** When you work with a configured Feature Definition or Element Template, the pay item and its associated information are applied automatically as each element is created. The right data is captured in the background with no additional steps and no interruption to your design.
- **Deferred Pay Item Selection**
 - **How it works:** When it is more practical to design first, you can select or assign pay items later — at the point where quantities are being determined. You keep your natural design flow and make pay item decisions at the moment that best fits your process.

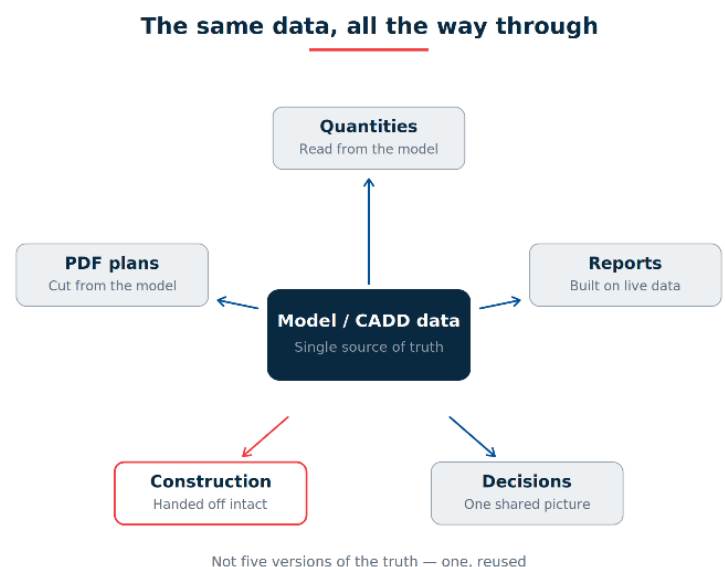
Both pathways lead to the same result: a design whose elements already carry the information needed for quantities, reporting, and construction — without asking you to change how you design.

What Item Types Do

Item types are a foundational capability in Bentley design products for attaching meaningful information to a model and extracting it later. In practical terms, an item type can carry almost any information on almost any element. It can read an element's properties, pull details from referenced elements such as station and offset, perform calculations and unit conversions, and draw on reference data maintained in a spreadsheet.

What makes item types valuable across the industry is **persistence**. Information carried in an item type stays with the element as the design moves between Bentley products, is converted to other file formats, or is opened in other tools/application downstream. The goal is information that remains useful to the greatest number of people, in the greatest number of situations, and in the greatest number of file formats — from design, through the handoff to construction, into the construction phase, and on into asset management.

This persistence is what lets the underlying model and CADD data serve as a **single source of truth**. Rather than maintaining quantities, plan labels, and reports as separate documents that risk being out of sync, every deliverable is derived from one authoritative dataset. When the design changes, the outputs change with it.



This allows what a decision-maker reviews, what a contractor builds, and what a report totals to all trace back to the same information.

Information That Travels with the Design

To meet that goal, NCDOT focuses on a core set of information that should be present and visible on an element at all times. This is a minimum foundation as item types can carry a great deal more.

- **Unique Identifier (Element ID)**
 - **Why it matters:** Every extracted quantity needs to trace back to the element it came from, so reports remain traceable to a single source of truth.
 - **What it enables:** Search and filter tools, inside and outside Bentley software, that let anyone isolate a specific element of interest.
- **Pay Item (Number and Description)**
 - **Why it matters:** A pay item connects each element to the specifications, materials, method of measurement, and standard drawings used in construction.
 - **What it enables:** Digital quantity reports organized by NCDOT pay item, the same filtering and querying available for unique identifiers, and full colorized data visualizations in iModels.
- **Location (Station / Offset)**
 - **Why it matters:** It places each element geospatially and gives a point of reference for QC and downstream use.
 - **What it enables:** Quantities viewed in useful combinations, such as quantities by alignment. Civil Expressions capture this location data automatically in nearly all cases, removing a significant amount of manual effort.
- **Calculated Quantity (Number and Formatted Text)**
 - **Why it matters:** Quantities need to be identifiable and summable as numbers in reports and exported spreadsheets, while a formatted text version carries the unit of measurement for clean annotations and presentation.
 - **What it enables:** Quantity takeoffs drawn directly from the design and tied to the pay item or alignment — feeding the reports, visualizations, and filtering described above.

A Foundation to Build On

This core set is a starting point, not a limit. NCDOT's digital delivery is an evolving program, and item types will grow with it. As the standards and tooling mature, new features and capabilities will come online over time — extending automation into more of the workflow, capturing additional information, and removing manual steps that are necessary today. The workflows described here are expected to advance alongside those capabilities.

Through that growth, the guiding principle stays the same: capture trusted, portable data as a natural product of good design — so the people who use it downstream can rely on it, and the people who create it are never slowed down.