



Features and Benefits

CAiCE™ Visual Roads® software is a comprehensive design tool that enables you to interactively create design models for transportation projects of all types. You can use it for projects ranging from simple roads to complex highways and interchanges, as well as railroads, airport runways, canals, and dikes. The software's powerful capabilities are well suited for complex jobs with intricate details and large data sets, and its unique fragment technology makes it completely customizable to any level of detail. CAiCE Visual Roads is easy to use and provides robust engineering and modeling capabilities for every phase of the design process.

CAiCE Visual Roads comes with the CAiCE Project Manager, drawing import/export capability (DWG, DGN, and others), basic drafting tools, and main graphics engine. It also includes the following components:

- **Coordinate Geometry:** Full-featured COGO functions including points, alignments, curves, spirals, intersections, cul-de-sacs, and many other functions.
- **Digital Terrain Modeling:** Complete DTM creation, editing, and display, including draping of raster images. CAiCE Visual Roads software's DTM methodology is optimized for large data sets such as those encountered in transportation projects. Provides all-in-one value package optimized for your surveying process.

Primary benefits include the following:

- **Adaptability to Client Design Standards:** Every design organization has unique, detailed requirements for roadway design. You can customize CAiCE Visual Roads to support detailed local design standards, such as alignment design constraints, superelevation application, profile constraints, and cross-section details.
- **Interactive Design:** The creation of alignments, profiles, superelevation specifications, and design models is completely interactive. The design utilities include built-in user-definable design tools that automate meeting design requirements such as minimum radius and spiral length, superelevation application, and sight distance on vertical curves.
- **Design Modeling:** CAiCE Visual Roads software's unique fragment technology provides a customizable method of modeling standard roadway components required for both simple and complex road design. The parametric nature of the technology provides flexibility for various types of projects. You can easily modify fragments to adapt to any design criteria.

- **Earthwork and Volume Computation:** Powerful yet easy-to-use earthwork computation capabilities enable you to classify and compute volumes for different material types.
- **Scalability and VBA Customization:** To meet the needs of small businesses and large organizations, CAiCE Visual Roads can be customized to meet your standards for coding, plans production, operations, and CAD.

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Feature	Function	Benefit
Fragments	<p>A fragment is a user-definable macro that either inserts surfaces into the cross-section file at a station or performs an intermediate part of the process of inserting surfaces. You can use fragments to analyze the surfaces in a cross-section file to produce reports, such as a milling and pavement overlay report for a contractor. Each fragment can have user-defined input parameters that determine their dimensions and behavior in particular situations.</p> <p>Fragments respond flexibly, based on existing conditions and design parameters. They can be customized to match your organization's specific components. Setting the slope criteria enables fragments to respond to specific conditions and automatically blend into your design.</p>	<p>Using fragments, you can assemble a typical section model as a series of connected, standard, predefined roadway components. This provides an easy way to design a roadway by plugging in ready-made components such as raised or depressed medians, travel lanes, shoulders, ditches, catch slopes, berms, and benches. This technology saves time and simplifies roadway design. It also provides interactive, component-based modeling for easy adaptation to changes in conditions (profile grade, width, cut and fill, superelevation).</p> <p>Fragment technology also enables you to develop design models interactively. Rather than repeatedly running a batch process, analyzing the results, and tweaking the input, you can interactively develop a typical cross-section design at one station, save it as a template that can be applied to other stations, move to different stations to graphically modify the results, and then save the entire job as a design file that you can rerun as needed.</p>
DTM modeling and viewing	<p>Powerful and fast DTM algorithms mean your systems perform well even with large DTMs. DTM features include the following:</p> <ul style="list-style-type: none"> • Ability to easily handle large data sets such as USGS DEM (digital elevation models) • Ability to drape single or multiple USGS 7.5-minute quad maps onto a DTM surface model • Simplified point and breakline editing 	<p>Extremely fast DTM creation, viewing, and editing help increase your productivity.</p>

Feature	Function	Benefit
	<ul style="list-style-type: none"> • Cross-section construction • Tagging of obscured areas • Easy loading and construction • Curved breaklines • Viewing, rendering, and editing • Freehand cross sections and profiles • Terrain and DTM visualization • Color by elevation • Breakline crossing resolution • Ability to easily combine existing and proposed surface models • Accurate earthwork computation using surface-to-surface volumes • Ability to view aerial photographs at correct location, scale, and orientation • Ability to drape aerial photographs onto DTM surfaces • Ability to map images to real-world coordinates • Realistic, on-the-fly renditions of survey data • AVI files for drive-throughs, reviews, and client presentations 	
<p>Coordinate geometry, including picker controls</p>	<p>Powerful interactive COGO commands include</p> <ul style="list-style-type: none"> • Point editing and creation • Intersection of geometry objects • Street intersections • Cul-de-sac creation • Best-fit curve and alignment • Manual traverse entry • Parallel offsets, including spiral offsets • Curves and compound curves • Spiral, spiral-curve-spiral, and compound spiral elements • Point location by bearing and distance, or angle and distance • Ability to store curves by one, two, and three points or by definition of any two curve components • Ability to store concentric, nonconcentric, and best-fit curves (and many others) • Graphical and interactive intersection commands for all geometry elements (points, lines, curves, chains, and spirals) 	<p>All COGO commands are graphical and interactive. Picker controls provide access to alternate COGO commands within other COGO commands. You can stay in a single command to perform multiple COGO operations and avoid jumping from command to command.</p>

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Profile definition	<ul style="list-style-type: none"> • Use numerical input and interactive graphical methods to create profiles • Calculate vertical curve lengths to pass through a known station and elevation • Calculate best-fit profiles through points surveyed on an existing centerline • Automatically check for sight distance criteria and overlap • Use custom profile table with k-sag and k-crest values 	<p>The profile definition command offers added flexibility with tools for interactive layout and design consistency checks of design profiles. It uses tables that you define to quickly specify design speeds and k-crest and k-sag values.</p>
Surface modeling for grading plans	<ul style="list-style-type: none"> • Define 3D surfaces from user-defined shapes • Easily design building pads, retention basins, dikes, retaining walls, ditches, gore areas, bridge end-fills, interchanges, and other 3D surface shapes • Develop special grading for intersections 	<p>The 3D visualization tools in CAiCE Visual Roads provide a fast and interactive way to transform existing and proposed DTMs for site design, commercial land development, and complex or special situation road design scenarios (bridge end fills, building pads, inside roadway corners, and so forth).</p>
Cross-section design	<ul style="list-style-type: none"> • Define proposed cross sections with a customizable library of fragments • Define any criteria and methodology for milling, leveling, resurfacing, and widening • Use design surfaces that automatically adapt to different conditions such as low cut and fill, high cut and fill, guardrail widening, additional lanes, rock and special material excavations, and changes in superelevation • Hook design components to chains and profiles for automatic widening, slope changes, and ditch definition • Use partial templates to apply reoccurring portions to different types of roadways • Use multiple alignments and profiles • Develop designs interactively, with a batch process, or a combination of both 	<p>The software's flexibility helps you quickly and easily define proposed cross sections with customizable fragment libraries. You can also design multiple alignments and roadways simultaneously for increased productivity.</p>
Superelevation definition	<ul style="list-style-type: none"> • Customizable superelevation and runoff table files • Support for multiple slope and special shoulder superelevation • Automatic resolution of overlapping transitions on short tangents • Support for manual definition of superelevation, or manual overriding of calculated superelevation • Support for various runoff transition rules • Allows tangent runoff distances to be fixed or extrapolated 	<p>You can automatically compute the superelevation transition stations based on user-defined superelevation and runoff tables that adhere to regional, state, or organizational standards. The ability to control the pivot location (centerline, inside edge of pavement, and so forth) provides greater flexibility.</p>

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Drainage tools	<ul style="list-style-type: none"> • Analyze and view surface slopes, water flow directions, and catchment areas • View cut slopes, fill slopes, ditches, embankments, and limits of construction with user-defined colors and symbols 	Using your roadway design data, you can quickly and efficiently design accurate drainage support systems for your proposed design.
Earthwork analysis	<ul style="list-style-type: none"> • Define roadway models and earthwork classification tables that produce quantities not only for excavation and embankment, but for pavement, base and sub-base materials, gravel fill, topsoil stripping, rock excavation, milling, leveling, overlay, and any other materials • Calculate volumes for all project phases using average end-area method • Produce quantities for asphalt and concrete surfaces, structural shapes, surcharge, and any other material types • Produce detailed, customizable volume reports • Define material exceptions for run-ins, run-outs, and bridge gaps 	CAiCE Visual Roads provides fast quantity estimates that are flexible and detailed, improving your productivity and reducing errors.
Quantity estimating	<ul style="list-style-type: none"> • Produces detailed quantity tabulations from a user-defined database of pay items • Links pay items to specific feature codes in the project database • Tabulates quantities for all or any part of the project • Summarizes any selection of pay items • Calculates quantities from user-defined formulae based on the number of items found, total length, total area, and total volume • Tabulates in ASCII reports or to Microsoft® Excel spreadsheets 	The software provides a fast and easy way for design items to be associated with a standard feature and pay-items table so that you can compute detailed pay-items reports based on per-item, length or area. Costs can be associated with the pay-items computed.
Mass haul	<ul style="list-style-type: none"> • Tabulates mass haul reports • Draws mass haul diagrams • Calculates free haul, dead haul, and overhaul distances 	The enhanced plotting of mass haul diagrams provides more detailed comparatives with split screen capabilities for viewing both the plan and diagrams. This feature also creates accurate mass haul estimates, enabling you to better monitor construction and cut costs.
Stakeout reports	<ul style="list-style-type: none"> • Creates roadway stakeout reports directly from design cross sections • Supports customized report formats using ASCII text files, Word documents, or Excel spreadsheets 	You can save time with CAiCE Visual Roads software's user-defined reports for construction stakeout and easily upload to the data collector.

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	<ul style="list-style-type: none"> • Exports stakeout information directly to industry-standard data collector formats • Produces customized stakeout reports through Microsoft® Visual Basic® for Applications (VBA) macros 	
Redesign	<ul style="list-style-type: none"> • Easily modify design information and run it in batch mode • Make individual modifications interactively following a batch run • Use command strings to store interactive utilities and rerun them in batch mode 	CAiCE Visual Roads enables you to visually change design parameters and apply the changes in a batch mode to automatically update the appropriate geometric and cross section database objects, increasing productivity.
Custom reports and plans	<p>Using integrated VBA functionality, you can create a variety of reports and drawings in any format you choose. For example, you can use VBA to create customized alignment and profile descriptions, cross-section surface reports, quantity estimates, milling and overlay reports, stakeout reports, and cross-section drawings. With VBA you can produce custom reports and drawings that best suit your individual requirements.</p> <ul style="list-style-type: none"> • Create customized reports for pay item quantities, alignment and profile descriptions, pavement milling, and overlay tabulations • Use VBA to link your project database to Microsoft Excel, Microsoft Word, Microsoft Access, ArcView™, and other programs • Create Visual Tugboat® (VBA) macros—step-by-step workflow wizards—to help new users learn the software quickly 	VBA customization offers a fast and easy way to make CAiCE Visual Roads adhere to your workflow standards and requirements. This reduces training time and increases productivity.
Drafting and plans production	<ul style="list-style-type: none"> • Plotting—plan, profile, cross sections, and plats • Text manipulation, editing, and labeling • Customizable annotations of alignments and profiles • Intelligent labeling of station-offset-elevation information that automatically updates with design modifications 	CAiCE Visual Roads minimizes drafting cleanup time, so you can focus on data quality instead of on data presentation.
Translators and CAD compatibility	<ul style="list-style-type: none"> • Ability to import and export data from other civil software packages • Complete compatibility with AutoCAD® and MicroStation® software • Dynamic links to AutoCAD and MicroStation through Visual CADLinks technology 	Import and export capabilities allow the reuse of existing data in other formats, easing the transition to CAiCE Visual Roads software.

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Database properties	<ul style="list-style-type: none"> • Database designed for surveying, terrain modeling, and roadway design modeling operations • Double-precision storage for all values • Full geodetic support for state plane zones, Universal Transverse Mercator (UTM) zones, and grid-to-ground conversions 	Full 32-bit precision eliminates dependence on the accuracy of a CAD drafting tool and ensures accuracy and integrity of all digital design data.
Visualization, graphics, and imaging	<ul style="list-style-type: none"> • View contours, wireframe grids, slopes, and drainage information in 3D • View background files • View aerial photographs at their correct location, scale, and orientation • Drape aerial photographs onto DTM surfaces • Use JPEG, TIFF, BMP, CMP, KODAK, and other major formats • Map images to real-world coordinates • Display realistic, on-the-fly renditions of proposed road • Create and play AVI files for drive-throughs, design reviews, and client presentations 	<p>Visualization is done in real time directly from the project database and does not require extensive preparation. As a result, design modeling becomes a visual process with highly realistic renderings of existing and proposed conditions. Problem areas and conflicts are easy to see, and you can instantly see the results of modifications.</p> <p>In addition, visualization tools help to make your presentations even more effective.</p>
FHWA IHSDM ToolBox	You can analyze horizontal and vertical alignment data against various safety models defined by the Federal Highway Administration's (FHWA) Interactive Highway Safety Design Model (IHSDM) software.	The software's IHSDM ToolBox provides the tools you need to ensure your designs are safe as defined by the FHWA. The ability to quickly and accurately perform safety checks for impacts against proposed design scenarios that include design consistency, intersection reviews, and crash predictions is invaluable.



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