![Bentley - Advancing Infrastructure / CONNECT Edition logos and aerial photo]

Image courtesy of Manhard Consulting, Ltd.

OpenSite™ Designer CONNECT Edition
Optimizing Outcomes

OpenSite™ Designer CONNECT Edition is an innovative application for designing site development projects of all types, large or small. Delivered with industry leading conceptual design capabilities for creating and analyzing project feasibility. The application is an all-in-one solution and handles a wide variety of complex tasks such as parking lot layout, building interaction, earthwork grading, general site design, ponds, sanitary and stormwater network design, subsurface utilities, construction documentation creation, and production of construction staking reports. OpenSite Designer blends traditional engineering workflows for plan, profile and earthworks with 3D parametric modeling and earthwork optimization to enable model-centric creation of all design deliverables.

The CONNECT Edition

The SELECT® CONNECT Edition includes SELECT CONNECT *services*, new Azure-based services that provide comprehensive **learning, mobility,** and **collaboration** benefits to every Bentley application subscriber. *Adaptive Learning Services* helps users master use of Bentley applications through CONNECT Advisor, a new in-application service that provides contextual and personalized learning. *Personal Mobility Services* provides unlimited access to Bentley apps, ensuring users have access to the right project information when and where they need it. *ProjectWise® Connection Services* allow users to securely share application and project information, to manage and resolve issues, and to create, send, and receive transmittals, submittals, and RFIs.

Designing in Reality Context

OpenSite Designer excels at data acquisition enabling users to consume multiple data types to effectively understand site and existing conditions. From photogrammetry and total station surveys to GPS, LiDAR, point clouds, and reality meshes, the application can upload, analyze, and manipulate field data, while ensuring the provenance of the original data. In addition, you can rapidly capture the "as-built" condition of an existing site or asset using Bentley's ContextCapture to quickly produce 3D models from photographs.

Rapidly Model Design Intent

OpenSite Designer's design intent capabilities help you build associations and relationships between civil elements to ensure the design project is reflective of engineering intent to improve design efficiency. The software delivers patented design capabilities using parametrics and optimization to rapidly create and analyze site development projects. OpenSite Designer allows users to evaluate design intent in the earlier stages of a project to assure optimal design delivery.

![Screenshot of OpenSite Designer showing a site plan with aerial imagery]

Quickly and easily create design alternatives while integrating existing site conditions, corridors and building models to deliver an integrated model-centric workflow.

OpenSite Designer also includes preconfigured commonly used 2D and 3D parking lot, sidewalk, and driveway requirements. You can make use of civil cells to ensure standards are implemented, while accelerating design production by reusing cells.

Integrate Multiple Disciplines

OpenSite Designer provides an open modeling environment for the project delivery of site development projects, unifying design and construction. Users can easily integrate data from different disciplines to improve collaboration and ensure the latest model is used in all phases of the design. Working in the live model reduces risk by utilizing the data interactively and working among site, rail, road, bridge, drainage, subsurface utilities, geotechnical, and other design teams to help identify conflicts earlier in the process and eliminate construction errors and delays. Employing an open modeling environment allows users to share data that is relevant to the project and to enrich project understanding, identify potential risk, and make better engineering decisions in the design phase.

Adapt to Change

Bentley understands the demands on you to produce models that provide information beyond documentation and construction, into operations, maintenance, and rehabilitation — and back to design, if necessary.

Using a model-centric approach, designs are dynamically updated throughout the model, guaranteeing that the current design is readily available for all team members. A federated modeling approach helps you make better-informed decisions earlier in the design process with more complete conceptual designs; eliminate errors and omissions in the documentation process by having fully synchronized documentation from the model; explore and analyze many options to maximize the performance of the asset in the real world; and reuse information to improve construction and operations of the asset.

Improve Project Deliverables

OpenSite Designer automates the production of a complete array of design deliverables. The application enables engineers and designers to work faster, smarter, and more efficient to accelerate project delivery. OpenSite Designer offers users the flexibility to work in ways that maximize their skillsets allowing for better projects. To automate the drawing process, the application instantaneously synchronizes the model to produce high-quality documentation that is the result of the drawing composition process. Since all deliverables adhere to the same project standards and come from the same model, you can be confident of your deliverables. OpenSite Designer provides design, volume, and analysis in XML industry-standard

format for data exchange and reporting. Project data can be used in multiple formats, including Excel spreadsheets, HTML or text files, PDFs, printable documents, and other output. Reporting capabilities automate the production of a variety of standard reports, including quantity takeoffs, clearance reports, stakeout, legal descriptions, and surfaces. The application outputs standard formats for Trimble, Topcon, and Leica for machine-controlled grading and machine guidance.

Visualizing Designs

Experience designs in real time with OpenSite Designer constraint-driven templates, context sensitive, intuitive interface, and dynamic 3D modeling. You can virtually move through the 3D site model and visually inspect it for any design deficiencies or physical conflicts. In 3D QA, you can fully view site features from all angles to check grading issues, utility conflicts, and site performance. Using OpenSite Designer rendering features – for example, color fill, material, shading, lighting, and backgrounds – improves the design at any phase and adds a level of assurance in project constructability. OpenSite Designer seamlessly integrates with Bentley LumenRT to create models and high-impact visuals and animations to effectively communicate the design intent to stakeholders for project approval.
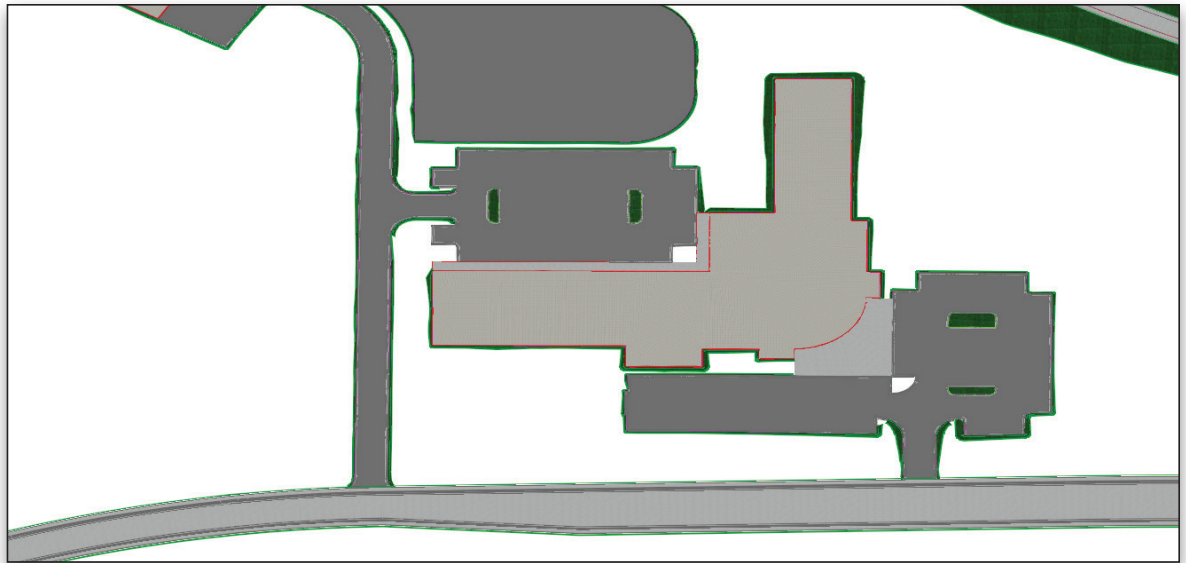
Review designs in real world context for better decision making.

OpenSite Designer CONNECT Edition At-A-Glance

Integrated CAD Capabilities
- Integrate data with MicroStation®, ProjectWise, OpenBuildings™, OpenFlows™, LumenRT, and other Bentley applications
- Support for managed workspaces
- Works across references files
- Include other engineering data (e.g. drainage) as referencing it to the DGN model
- Utilize an unlimited number of federated reference files
- Create and edit CAD elements
- Read and write to DGN and DWG files
- Supports design history
- Apply digital signatures using industry-standard encryption

- Secure digital rights definition for reviewing, printing, and editing
- Supports multiple raster formats
- Supports PostScript and HPGL2/RTL printing
- Use AccuDraw® and AccuSnap™ navigation tools
- Track annotation

Reality Modeling
- Read/write standard data formats for:
  - » 2D/3D CAD graphics
  - » ASCII/text data
  - » LandXML
  - » LiDAR data: ASCII and LAS

- » USGS digital elevation models
- » Photogrammetric data
- » Raster files
- » Contour maps
- Import and analyse point-cloud data
- Merge surfaces automatically
- Update surface data dynamically

Terrain Modeling
- Create intelligent, data-rich and lightweight terrain models
- No need for secondary terrain analysis to represent the terrain display. Includes context sensitive re-symbolization for triangles, contours, linear features, slope vectors, color code for slopes, elevation banding, and aspect
- Create terrain models from a variety of import sources
  - » Reality models
  - » 3D graphical data automatically using graphical filters
  - » ASCII/text data
  - » Legacy data formats of InRoads, GEOPAK, and MX
  - » Point clouds
  - » LandXML
  - » LiDAR data: ASCII and LAS
  - » USGS digital elevation model data
  - » Aerial data
  - » Raster files
- Ensure live, federated, and intelligent terrain models when stored as a DGN element
- Maintain terrain models through the preservation of relationships to source data
- Ensure correct entry with undo/redo capabilities
- Standardize displays via element templates
- Use across multiple disciplines via reference files in an open modeling environment
- Re-symbolization of display across multiple disciplines using an open modeling environment
- Control maximum length of triangles
- Control boundary conditions
- Create complex and clipped terrain models
- Interrogate the intelligent data-rich 3D models
- Support for different feature types including but not limited to boundaries, holes, voids, breaklines, inferred breaklines, and random points
- Model intelligent 3D real-world civil features (ditches, curbs, trees, and culverts)
- Context-sensitive intelligent editing of features
- Dynamic editing for
  - » Extend, trim, and intersect features
  - » Insert, move, and delete vertices
  - » Delete, partially delete, break, or join features
- Manage large LiDAR datasets
- Exclude non-DTM features from triangulation
- Control density of points on linear features for optimal surface presentation
- Display cut and fill delineation
- View and edit feature properties
- Contour smoothing
- Major, minor, and depression contours
- Automatic and manual contour labelling

Modeling
- Model multiple design scenarios
- Edit designs dynamically
- Automatic model updates driven by design intent
- Design time visualization with automatic material assignments

- Undo/redo capabilities
- Interactively interrogate federated 3D models with dynamic cross sections
- Manage 2D/3D models and display representation
- Use enhanced clipping and point controls
- Integrate and utilize CAD graphical elements in the model
- Create model reports dynamically
- Generate plan ready cross sections
- Adheres to regional design standards

Dynamic Geometric Design
- Interactive geometry capabilities
- Enhanced integration with AccuDraw® and AccuSnap™ through CivilAccudraw
- Multiple vertical geometries supported per alignment
- Design time standards input and feedback with errors and warnings in Civil Message Center
- Store rules and relationships between geometric elements
- Create horizontal/vertical by PI method or by elements
- Offset capabilities to easily create complex yard layouts
- Create circular and parabolic vertical curves
- Create arc and chord horizontal curves
- Support tangential and non-tangential curves
- Edit elements associatively and dynamically
- Define curves by radius, degree of curvature, and pass-through points
- Edit, delete, and join elements
- Support delta angles greater than 180°
- Annotate alignments and points with object attribution, geometric properties, stationing, dynamically and automatically
- Additional annotation capabilities for one-off object labeling
- Review and report geometry in a variety of customizable formats
- Perform design checks dynamically or in batch processes
- Display 3D geometry

Template Libraries
- Support for surface and linear templates
- Include components, end conditions, and features
- Create components for real-world objects such as lanes, curbs, walls, ditches, and barriers
- Define parametric components graphically
- Apply constraints to components
- Place component points as free, partially constrained, or fully constrained
- Set constraints as horizontal, vertical, sloped, projected, vectors, offsets, and elevations
- Constrain end conditions partially or fully
- Set end conditions to trace existing surfaces such as rock
- Drag-and-drop assembly of templates from components and end conditions
- Perform graphical tests to verify design

Site Layout Modeling
- Create custom parametric parking lots
- Modify parking limits by simple line and point manipulation
- Modify parking limits to remove parking spaces
- User controlled design standards
- Revise parking orientation with customized direction path
- Control size requirements for parking spaces, islands, bays, and aisles
- Parametric revision of island locations and quantities
- Integrate building(s) from OpenBuildings™ and other building design software
- Parametric interaction between parking and building for optimal site configuration

- Control building exterior design items: sidewalk, parking, and landscaping
- Create Other Pads to represent unlimited design objects
- Control parametric parking design inside of pad area

Earthworks
- Automatically optimize earthworks grading based on site configuration
- Customizable grading control: min/max slopes, link heights, elevation control
- Control building(s) finished floor elevation
- Use object material depth during optimized grading
- Use Constraint Area for grading control of objects and areas
- Control grading direction
- Analysis optimized grading solution for potential design problems
- Detail control of surface using breaklines
- Set borrow and fill areas for soil movement control
- Create and customize driveway paths
- Control design features such as on-side parking, sidewalks and shoulders

Pathways
- Customize on-side parking to control location, parking size requirements, angle and grading controls
- Build sidewalk with controlled locations, width, material type, grading slope control
- Set drive way widths either "symmetrical" or "non-symmetrical"
- Control drive taper and transitions
- Adjust driveway end return radius's
- Adjust centerline alignment grading control for use in grading optimization
- Control shoulder width, buffers, slope, ditch offset, and ditch slope
- Place sidewalk automatically or manually
- Control sidewalk design requirements such as width, min/max slope and elevation control
- Use "Driveway Connection" to connect "Driveway" to corridor model

Design Phases
- Let's users choose between three different design phases: Conceptual, Preliminary, and Final
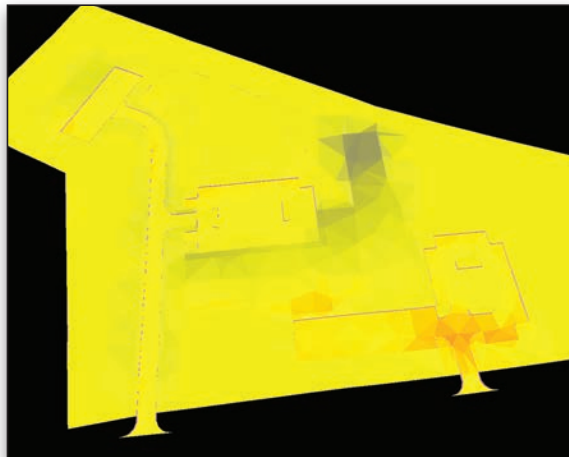
Earthwork optimization analysis, thousands of design scenarios to identify a solution and review for potential issues, real-time, by the click of a button.

- Quickly create design scenarios using conceptual design capabilities
- Revise design features to create preliminary site designs
- Move project to final for detailing and creating deliverables

Subsurface Utilities
- 3D modeling
- Create 3D utility model relative to topography and alignments
- Support interconnected network of pipes, curved pipes, channels, culverts, manholes, pumps, catch basins, and inlets
- Create associative and dynamic model-based designs
- Create storm, sanitary, or combined hydraulic networks
- Build utility models directly from survey data
- Identify graphics as utilities and drape relative to DTM
- Display all network and utility objects in sections and profiles
- Display as realistic 3D models for effective collaboration
- Identify conflicts among utility elements as well as among utilities and other 3D data
- Label all attributions in any view or include in user-defined reports
- Create user-defined attributes for any required data
- Draw 3D models of utility structures as full 3D shapes for easy clash detection
- Hydraulic design and analysis
- Analyze and design using industry-standard theorems such as Mannings, Colebrook-White, Bernouli, and continuity equations
- Analyze and design based upon HEC 22, FHWA, HDS 5, 10, 13, Rational Method, Wallingford Procedure, and regression equations
- Analyze and design using steady state gradually varied flow, and run simulations using unsteady state time-varying flow
- Compute Tc using methods such as TR-55, HEC-22, and Kinematic Wave
- Compute losses using methods such as SCS CN, Green and Ampt, Horton, Initial and Constant Rate
- Compute runoff using methods such as Rational, Modified Rational, ILSAX, SCS, and Unit Hydrograph
- Use demand and demographic tables
- Supports infiltration, population, peaking factors, and land usage
- Compute or specify flows
- Define custom intensity-duration-frequency tables
- Generate drainage queries and customized reports
- Color code based upon queries or styles
- Calculate pond volumes
- Create input and output hydrographs
- Design inlet and outlet control structures
- Use PondMaker for inflow/ storage/outflow optimization

Profiles and Cross Sections
- Create/generate cross sections and profiles along alignments, graphics, or between points
- Created directly from 3D model and supports federated multidiscipline models
- Include vertical alignments and existing and proposed surfaces
- Automatic user-defined annotation of points and segments
- Additional annotation tools available for one-offs
- Cut cross sections orthogonally or at skew
- Create custom cross sections
- Dynamic update for cross sections and profiles via referencing

Quantity Management
- Extraction of quantity take-offs for estimating
- Element pay item attribution

Report quantities by entire project or delineate by sheets, stations, area, or phase
- Generate linear, area, and volume quantities
- Modify sample reports or create custom reports through XML style sheets
- ODBC link capable for fully customizable reporting

Visualization
- Walk / drive through interactively or along a defined path or corridor
- Visualize paths through the project relative to design control by offsets and vehicle speeds
- Predefined materials applied to components enabling realistic rendering
- Position sun for geographically defined locations to ensure realistic shadow patterns
- Animate vehicles in traffic lanes without additional software
- Populate 3D objects along linear paths and within designated areas
- Apply traffic paint striping plans to the 3D model
- Use sample vehicle library and plantings
- Image draping on DTM or 3D objects
- MicroStation®-based rendering
- Real-life textures
- Lighting effects
- Elevation and perspectives
- Creation of fly-throughs and animations
- Creation of 3D PDFs
- Support for engineering data, point cloud, reality meshes
- Seamless integration with Bentley LumenRT for real-time, immersive presentations
- Solar and shading analysis

Contract Deliverables
- Live documentation capable
- Automate project delivery process with drafting and drawing preparation applications
- User definable annotation capabilities for plan, profile, and section labelling
- Extract sections, drawings, and reports directly from completed 3D model
- Automate sheet generation for plans, profiles, and cross sections
- Select from more than 550 included report formats
- Modify included reports easily in any text or XML editor
- Provide standard reports for bridges, superelevation, clearances, data collection, geometry, sections, DTM, legal descriptions, design, visibility, and more
- Compute volumes by surface to surface (triangulated surface comparison)
- Compute volumes by 3D objects

Publishing
- Export directly to Machine Guidance
- Supports iModel creation (include 2D and 3D geometry and business data)
- Support industry standards, such as LandXML
- Export alignments, surfaces, and other pertinent design information to other systems via XML
- Generate PDFs and 3D PDFs
- Direct plotting
- Integrate with Google Earth™

Integration with Bentley Content Management and Publishing Solutions
- Component-level integration with ProjectWise® for collaborative design and engineering project management

- Integration with ProjectWise® InterPlot® for automated plot set generation and web-based access to plot archives
- Integration with Bentley® Navigator for design review, construction simulation, or automated clash resolution

Geotechnical Integration
- Directly interface with gINT database
- Visualize and annotate borings in 2D
- Visualize and annotate borings with separate strata in 3D
- Create subsurface terrains from boring data

Create models and high-impact visuals to effectively communicate design intent to stakeholders for project approval.

Reality Modeling
- Reality mesh support
- Display of very large, photo-textured reality meshes produced using ContextCapture
- Editing of meshes (remove facets, fill holes)
- Automatic ground extraction
- Breakline extraction
- Efficient 3D modeling using sections and templates
- Mesh classification to enrich mesh with data from many sources
- Orthoimage extraction on any axis
- Generation and manipulation of cross sections
- Production of 3D PDFs and iModels

Point-cloud Processing
- Fast display and visualization of billions of points
- Drape and snap elements
- Classification editing
- Smart Snap
- Batch tile export
- Pointools, POD, LAS, and XYZ file export
- Extraction of planar and cylindrical elements
- Linear feature extraction
- Re-color points for flexible presentation
- Class management for any type of presentation style
- Definition of custom classes
- Point-cloud colorization from orthophotos
- Clip and section manager
- Support of geographic coordinate systems

Scalable Terrain Modeling
- Creation of scalable terrain models (STMs)
- High-performance display of very large digital terrain models (DTMs)
- Display modes for smooth shading, smooth shading with shadows, aspect angle, elevation, slope, contours

- High-resolution image draping on STM
- STM update and synchronization with DGN files, civil DTMs, point-cloud data, and XYZ files
- Calculate view shed from point or path

Raster Data Interoperability
- ECW (unlimited), PDF, IMG, JPEG 2000, BIL, DOQ, FLI, SPOT CAP, and Digital Image Map
- TIFF (1-to 32-bit), GEOTIFF, iTIFF, COT, CIT, RLE, CALS, PCX, IMG, BUM, TG4, INT, RGB, TGA, JPEG, RLC, RS, HMR, BMP, and IKONOS 3 (Red), and 4 (NIR) bands from GeoEye
- Compression schemes: Deflate, Pack-Bits, CCITT3, CCITT4
- Support for lossless compression formats: ECW, MrSID, and JPEG 2000
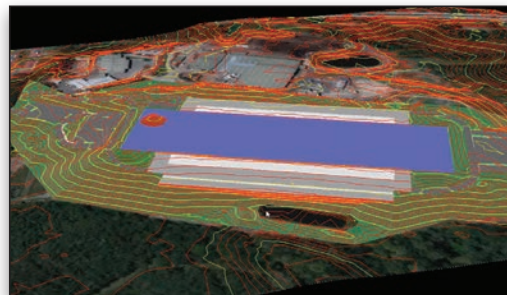
Incorporate topography and aerial imagery.