Utility Engineering
Subsurface Utility Engineering (SUE) is an engineering process that combines civil engineering, geophysics, survey and computer-aided design and drafting (CADD) / geographical information systems (GIS). Information on the location and condition of subsurface utilities is collated and assessed to reduce the occurrence of interference and conflict with valuable infrastructure.

Project and utility owners, designers, engineers and contractors can significantly benefit from adopting a SUE process during the life cycle of a project to avoid:

- Unexpected costly utility conflicts
- Project delays
- Utility damage
- Community issues
- Contractor claims

Cardno can undertake all geotechnical investigations, utilities detection, traffic management, modelling, conflict resolution and coordination internally. Our survey and utility detection team is in-house. Together we can provide the most extensive range of utility capabilities in Australia.

We have teams of experienced and accredited designers, engineers and project managers that can evaluate existing utility models and data then incorporate new designs, relocations and upgrades. Cardno brings together a national team of experts and handpicks the best team to suit your project requirements and handle projects of any size.

Cardno has accreditation to undertake all contestable utility design work including a national design panel contract with Telstra. Cardno also has business units devoted to HV/LV power engineering and water engineering. We have teams of GIS, CADD, 3D, 12D and BIM designers that support the engineering and management staff and have had experience working on some of the largest utility projects in Australia.

Cardno covers all utility scope from conception, bid management, cost estimation, design, coordination, modelling, approvals and construction phase support through to as-built models and asset management.

Our other business units provide the following complimentary services for the utilities team to service you:

- Environmental engineering
- Building services design
- Renewable engineering design
- Geosciences
- Asset planning and management
- Urban infrastructure
- Roads
- Rail
- Traffic
- Bridges
- Planning

**Subsurface Utility Engineering**

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Utility Detection and Mapping
Cardno uses both electromagnetic detection and ground penetrating radar (GPR) technology to designate underground utilities without disturbing existing conditions. Cardno also offers the application of GPR to identify:
> Pavement profiles
> Concrete structures
> Underground storage tanks
> Geological and archaeological features

Vacuum Excavation (Non-Destructive Digging)
Vacuum excavation is a non-destructive digging which utilises both hydro and air excavation to excavate without risk of damage to underground utilities and offers other benefits including:
> Minimal surface disruption with reduced reinstatement costs
> Reduced manual handling and risk of personal injury
> Reduced environmental impacts

Utility Coordination and Management
Cardno provides professional utility coordination and management as a specialised service throughout all phases of a project life-cycle. Professional utility coordination and management involves:
> Identifying potential subsurface utility conflicts with recommendations and engineering solutions for optimal outcomes
> Scoping and budgeting of required protective treatments and/or subsurface utility relocations
> Communicating and negotiating with utility owners and other stakeholders

Survey, GIS and CAD
Cardno is equipped with innovative digital plan production facilities that incorporate CAD, 12D and GIS. These provide a record of assets and infrastructure for surface and subsurface features, for the improvement of asset management and effective planning of construction works.

Structural Scanning
Cardno provides a variety of non-destructive testing services to the construction and engineering industry, and is able to provide the following information:
> Concrete slab thickness
> Location, spacing, size and depth of reinforcement
> Location of prestressing cables
> Utilities situated within a slab void
> Inconsistencies such as voids, cracks and honeycombing
> Safe areas for cutting, drilling or coring in concrete slab and walls
> Corrosion and moisture measurement
> Schmidt Hammer testing to determine compressive strength (megapascals)

AS5488-2013 Classification of Subsurface Utility Information (SUI)
Cardno played an important role in developing AS 5488-2013, the Australian Standard for the Classification of Subsurface Utility Information (SUI). Developed by Standards Australia, the Standard provides utility owners, operators, and other stakeholders with a framework for the consistent classification of information to manage subsurface utilities, and has improved public safety and reduced the risk of damage to utilities.
Key projects

Melbourne Metro Tunnel Project
MMRA, Golder Associates, Citywide | Melbourne, Victoria

Cardno was responsible for the management of public and utility owner notifications and permits, electronic detection of all utilities within the designated area, targeted trenching and borehole clearance by non-destructing digging and coring techniques up to 2 metres deep to obtain Quality Level A information, and reporting on manholes and pits. CCTV was also undertaken to investigate the existing stormwater and sewer infrastructure. The assets were surveyed and presented in a drawing to provide the client with critical utility information to enable the identification of potential conflicts in the proposed design. Cardno also coordinated traffic management plans and traffic control services.

Sydney Light Rail
ACCCONA and Laing O’Rourke for Transport for NSW | New South Wales

Cardno’s utilities team have been involved in four stages of the Sydney Light Rail project. In the Pre-tender stage, the team provided utility detection, mapping and survey for Transport for NSW. In the Management of Contractor Enabling Works stage, the team was responsible for utility relocation design for Laing O’Rourke. In the PPP Tender and PPP Design and Construction stages, the team provided utility tender design and utility detailed design respectively for ACCIONA.

Moreton Bay Rail Link
The Queensland Department of Transport and Main Roads | Queensland

Cardno provided mapping of existing subsurface utilities for the entire rail corridor, construction of a subsurface utility geographic information system (GIS) as well as ongoing professional utility co-ordination throughout the double Early Contractor Involvement (ECI) process and into preliminary construction. Cardno’s professional utility coordination and expertise was integral during the ECI process, by optimising risk management and delivering additional value to the principal contractor during the design phase of the project.

Anzac Square Refurbishment
Brisbane City Council | Brisbane, Queensland

Cardno delivered Structural Testing of the existing heritage listed sub-structure utilising both intrusive (core holing, breaking out and/or scrabbling back of localised areas) and non-destructive (concrete scanning, visual inspection) techniques. This included concrete scanning of selected members/element/exteriors of the slab to confirm reinforcement size and spacing using Ground Penetrating Radar (GPR) technology with the results provided graphically.
Key projects

**St Albans Level Crossing Removal Project**  
*Metro Trains | Victoria*

Cardno delivered utility investigation services during the feasibility and planning phase of this project. Services offered included utility detection, potholing, survey, and modelling. The investigation enabled Metro Trains and VicRoads to continue with planning for the future grade separation of this dangerous level crossing and undertake early construction activities such as utility relocation works with an accurate understanding of the location and condition of existing utilities within the project area, minimising the risk of damage to existing utilities and potential delays to Melbourne’s Transport Network.

**Ballarat Rail Line Upgrade**  
*Aurecon, Jacobs, Mott MacDonald Joint Venture | Regional Victoria*

Cardno provided specialist utility engineering services and professional utility co-ordination for the modification of existing utilities, the provision of new utility connections and utility stakeholder management to AJMJV for the 33km Ballarat Rail Line Duplication project. The information delivered by Cardno has assisted in the development of risk management strategies and scoping of potential subsurface utility relocations and has eliminated potential costly utility conflicts. Cardno also coordinated traffic management services during the utility mapping phase of the project.

**Brunswick Terminal Station Upgrade**  
*Aecom, SP Ausnet | Victoria*

Cardno performed surface geophysical methods including electronic detection and ground penetrating radar for utility mapping, and non-destructive digging and trenching works to expose and positively identify subsurface utilities at critical points. A detailed clash analysis was presented in AutoCAD to enable the identification of potential conflicts in the proposed design. Cardno continues to deliver projects for electrical asset owners including Richmond Terminal Station and Yallourn Power Station.

**HMAS Albatross**  
*Leighton Contractors Pty Ltd | HMAS Albatross Naval Air Base*

Cardno undertook CCTV investigations on the existing storm water and sewer infrastructure, UXO scanning experts to scan for potential unexploded ordnances in areas not previously undertaken, performed electronic detection for utility mapping and non-destructive digging and trenching works for utility verifications and positive identification. This project was completed two weeks ahead of schedule and within the original budget. Cardno is recommended as the preferred contractor for subsequent utility investigations as the project progresses.
About Cardno
Cardno is an ASX200 professional infrastructure and environmental services company, with expertise in the development and improvement of physical and social infrastructure for communities around the world. Cardno’s team includes leading professionals who plan, design, manage and deliver sustainable projects and community programs. Cardno is an international company listed on the Australian Securities Exchange [ASX:CDD].

Cardno’s commitment to Zero Harm
Cardno’s goal is to always conduct our business in a way that protects our people, clients, visitors and members of the public from harm. In an effort to move toward the ultimate objective of zero harm, we are committed to implementing safety systems and awareness throughout our operations globally.

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